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WAR MACHINE

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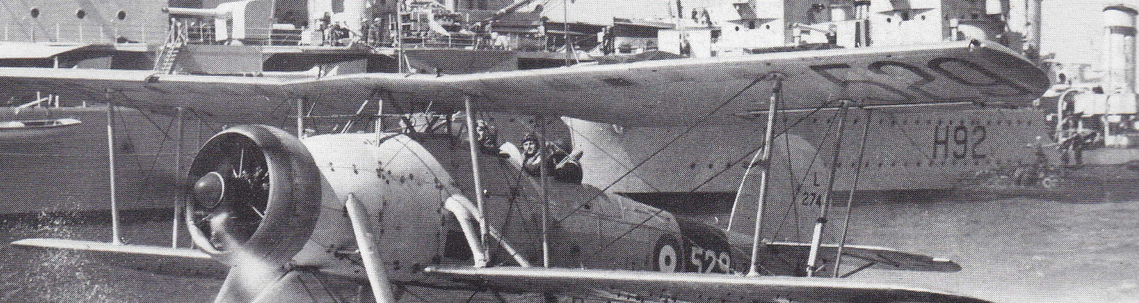
The Swordfish Afloat

Pacific Seaplanes

Heinkel He 115 in Action



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A fully illustrated guide to Seaplanes of World War II

WAR MACHINE

Volume 11 **Issue 122**

Published by
Orbis Publishing Ltd
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Colour profiles, diagrams and cutaway drawings © Pilot Press Ltd
Editorial Offices
War Machine
Aerospace Publishing Ltd
179 Dalling Road
London W6 0ES

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Design: Rod Teasdale
Colour Origination: Imago Publishing Ltd, Thame, Oxon

Typesetting: SX Composing Ltd

Film work: Precise Litho Ltd

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2861

Printed in Great Britain
by The Color Factory

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0488 72666

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Distribution and marketing offices:
Orbis Publishing Ltd
Orbis House
20-22 Bedfordbury
London WC2N 4BT
Telephone: 01-379 6711

Circulation Manager: Brian Anderson
Marketing Manager: Paul Stelb

WAR MACHINE

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Picture acknowledgements

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Seaplanes of World War II

The Heinkel He 59 first saw service in the Spanish Civil War, operated by the Legion Condor. By the beginning of World War II most had been relegated to training duties, but some were employed for reconnaissance, minelaying and air-sea rescue.

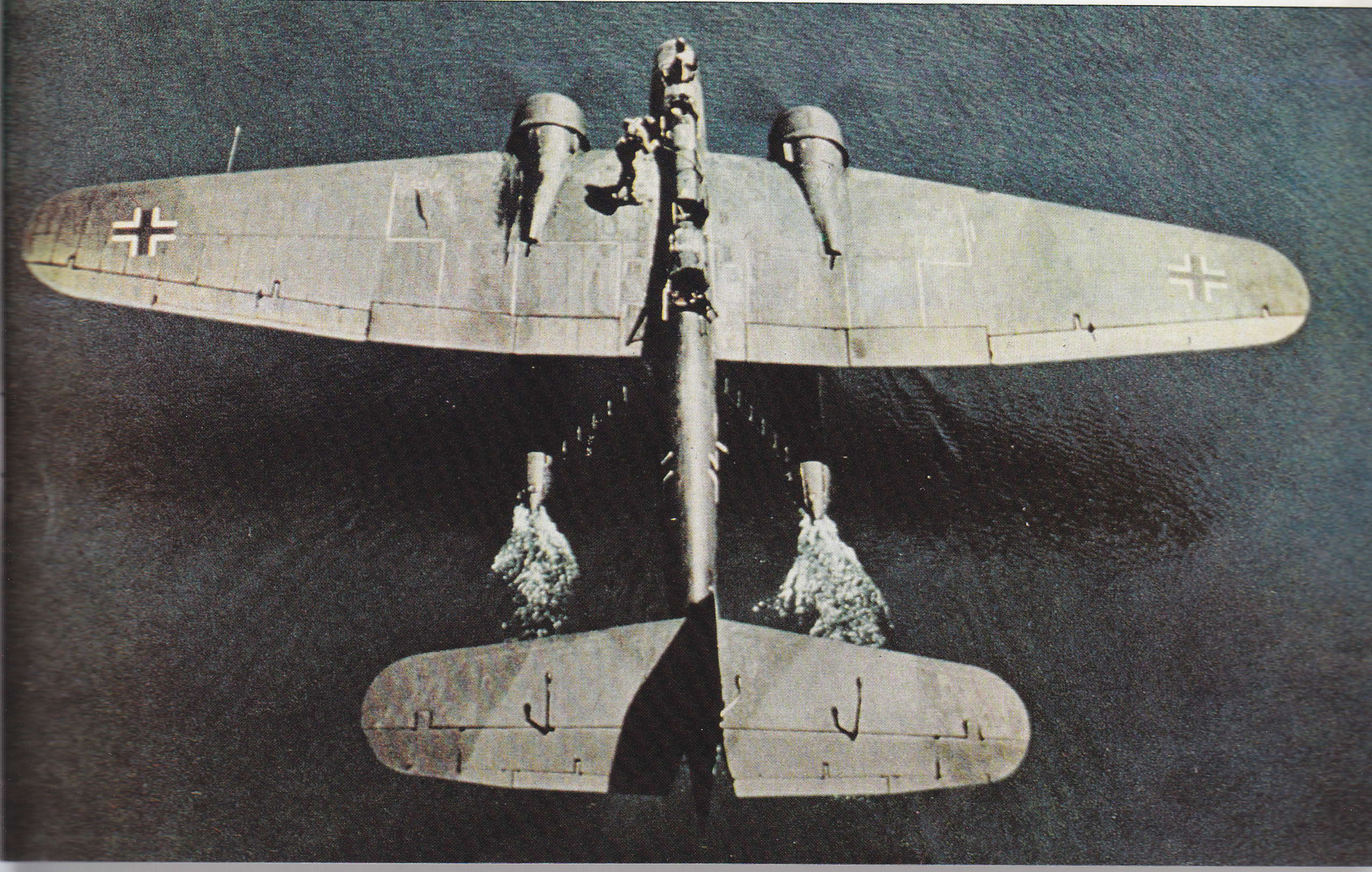
Seaplanes served in a wide variety of roles in all major theatres of war. A Japanese floatplane launched from a submarine dropped the only bombs to hit the American mainland; more significantly, seaplanes reconnoitred for many German commerce raiders, including* Bismarck *and* Atlantis*, and directed their long-range naval gunfire.

Regarded with hindsight as something of an anachronism, the float seaplane was flown with varying success by all the major powers during World War II, performing all manner of tasks from active combat to clandestine roles such as delivering agents to hostile coastlines. Of all the major warring nations, however, the UK employed this type of aircraft least and was the first to discard it, most of its usual duties being more conveniently performed by carrierborne aircraft, flying-boats or even long-range land-based aircraft. Indeed in the Royal Navy the Swordfish and Fairey Seafox seaplanes survived in service only in the traditional role of gunnery spotting with cruisers and capital ships until susperseded for ever by the advent of radar relatively early in the war. It was perhaps ironic that four other seaplanes, the German Heinkel He 115, the French Latécoère 298, and the American Vought Kingfisher and Northrop N-3PB Nomad gave more extensive service with the British forces than did the indigenous types. The great maritime powers, the UK, the USA and Japan, all employed floatplanes aboard their capital ships, as did Germany and Italy, their use being mainly confined to limited sea patrolling and ship-to-shore communciations.

However, whereas all-out efforts were made by the UK and the USA to bridge the Atlantic with flying-boats and long-range land-based aircraft to counter the depredations of enemy surface raiders and submarines, the Pacific's vast expanse encouraged widespread use of floatplanes, particularly by the Japanese; indeed the only bombs dropped by aeroplanes on the USA during the war were two light bombs from a Yokosuka E14Y1 carried by a Japanese submarine to within range of the American mainland.

The US Navy was equipped with a variety of floatplanes, including the Curtiss SOC Seagull and Grumman J2F Duck biplanes and the Curtiss SO3C, SC-1 Seahawk and Vought OS2U Kingfisher monoplanes. Of all these the venerable Seagull probably enjoyed the most illustrious service career, being present in the actions at Guadalcanal, Wake, Gilbert and Marshall Islands, and also serving aboard American warships in the Atlantic and Mediterranean until 1944.

A Heinkel He 115 taxis to take-off position, displaying the distinctive planform of the wings derived from the earlier He 70 fast mailplane. The He 115 was the Luftwaffe's most successful floatplane; so successful that production, ended in 1941 on the completion of orders, was re-opened in 1943.



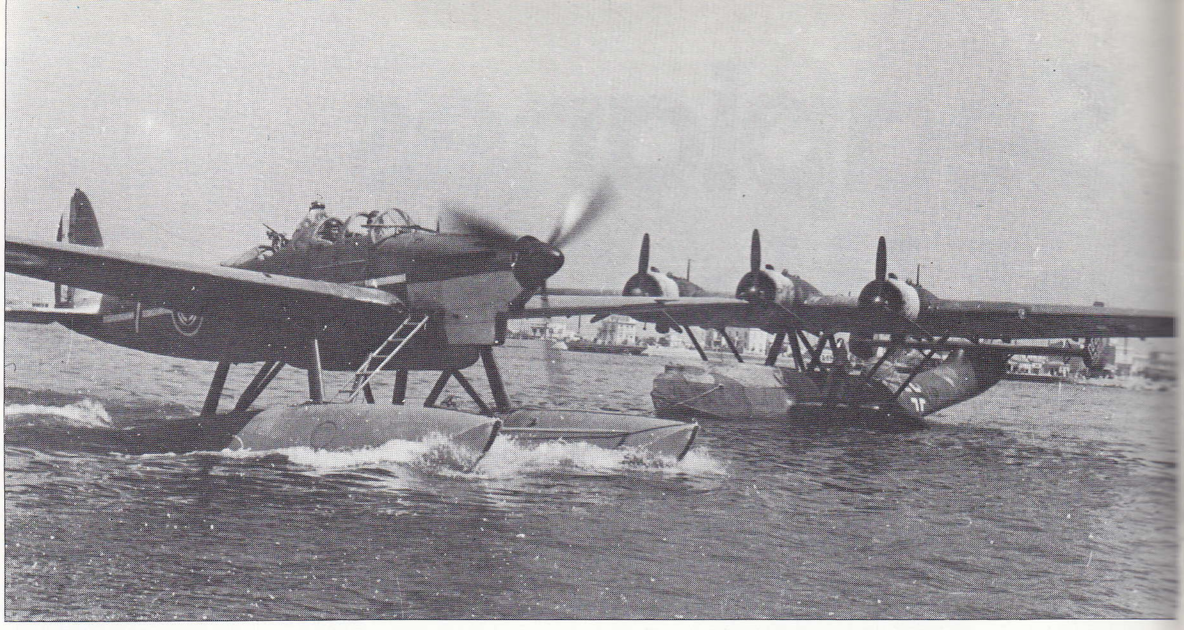
FRANCE

Latécoère 298

Most widely used of a dozen French floatplane types that were in service in 1939, the **Latécoère 298** saw considerable action during the Battle of France the following year. Of all-metal construction, this robust twin-float aircraft was intended for service with the seaplane carrier *Commandant Teste* and made its maiden flight on 8 May 1936, and by the beginning of World War II a total of 81 aircraft had been ordered, of which 53 had been delivered. Most aircraft (**Laté 298A** machines with fixed wings) were serving with Escadrilles T1 at Berre and T2 at Cherbourg, while about 17 **Laté 298B** and **Laté 298D** aircraft with folding wings and fixed wings respectively, were with Escadrilles HB 1 and HB 2 aboard the *Commandant Teste*. Another 65 Laté 298s were ordered on 22 November, a further *escadrille*, T3, having been formed on 15 September; T4 was to be formed on 15 January.

When the German attack in the West opened on 10 May 1940 the French navy possessed some 60 Laté 298s in front-line service; all were now shore-based as the *Commandant Teste* had been relegated to other duties, roughly half the force being based on the Channel Coast and the remainder in the Mediterranean. In the early stages of the Battle of France the Laté 298s were flown as cover for the Allied occupation of Walcheren, but were forced to evacuate Boulogne on 21 May, thereafter engaging in dive and level bombing attacks on the advancing German columns; on 23 May 18 of the seaplanes dive-bombed a number of key bridges in northern France with 500-kg (1,102-lb) bombs, losing four aircraft to enemy fire. Losses began to mount so that by 3 June the number of serviceable Laté 298s stood at 27, and it was deemed prudent to confine their attacks to night sorties, although a daylight attack was carried out by Laté 298s of T2 against enemy columns near Abbeville on 6 June. Seven other aircraft were lost before the armistice but about 30 aircraft (including the survivors of T2) made their way to Lac d'Oubeira in Algeria.

Production was reinstated in 1942 by the Vichy government, some 30 **Laté 298F** aircraft (similar to the Laté 298D) being built. Units of the Vichy air force in North Africa continued to fly the Laté 298s throughout 1942-3, and at least two *escadrilles* flew alongside the RAF in the Mediterranean until 1944 when French forces once more regained their autonomous identities.



A Latécoère 298 of the Vichy French air force passes a German Dornier Do 24 on the Aegean coast. The most widely-used French floatplane in 1940, Laté 298s were also flown by two escadrilles of the Free French.

Specification

Latécoère 298D

Type: two/three-seat torpedo-bomber and bomber floatplane

Powerplant: one 656-kW (880-hp) Hispano-Suiza 12Ycrs-1 inline piston engine

Performance: maximum speed 290 km/h (180 mph) at 2000 m (6,560 ft); climb to 1500 m (4,920 ft) in 5 minutes 42 seconds; service ceiling 6500 m (21,325 ft); range with maximum warload 800 km (497 miles)

Weights: empty 3071 kg (6,770 lb); maximum take-off 4800 kg (10,582 lb)

Dimensions: span 15.50 m (50 ft 10.2 in); length 12.56 m (41 ft 2.5 in); height 5.23 m (17 ft 1.9 in); wing area 31.6 m^2 (340.15 sq ft)

Armament: two fixed forward-firing 7.5-mm (0.295-in) machine-guns in the wings and one 7.5-mm (0.295-in) trainable machine-gun in the rear cockpit, plus 500 kg (1,102 lb) of bombs or one 670-kg (1,477-lb) torpedo, or depth charge

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ITALY

Cant Z.506B Airone

Largest float seaplane to give widespread operational service during World War II (although arguably the convertible Junkers Ju 52/3mW might lay claim to this achievement), the Italian **Cant Z.506B Airone** (heron) three-engine twin-float reconnaissance bomber was developed from the commercial Z.506A in 1936, production of the military aircraft starting the following year with a batch of 32 aircraft (Serie I) and differing from the earlier aircraft in featuring a long ventral gondola accommodating bomb bay, bomb-aimer's station and a rear ventral gun position; a semi-retractable gun turret was also added.

The early Z.506B aircraft were evaluated with the Aviazione Legionaria in Spain during 1939, 30 other aircraft having also been ordered by the Polish naval wing (in the event only one of the latter had arrived in Poland when the Germans invaded in September, and the remaining aircraft were taken on charge by Italy's Regia Marina). By the date of Italy's entry into the war in June 1940 the Z.506B was in full production, 95 aircraft having been completed by the parent company. Most of these were serving with the 31° and 35° Stormi Bombardamento Marittimo at Elmas and Brindisi respectively; these units were fairly heavily engaged during the campaign in Greece, although they seldom operated when likely to be opposed by RAF fighters. They participated in the capture of Corfu, Cefalonia and Zante, and attempted to shadow British naval forces after the Battle of Cape Matapan but sheered away when faced by Fleet Air Arm Fairey Fulmar fighters. Thereafter the Airone was almost entirely withdrawn from use as a bomber and torpedo attack aircraft, the Italian navy calling for its greater use in maritime reconnaissance, air-sea rescue, convoy escort and anti-submarine patrol roles: such had been the shift in naval superiority in the Mediterranean following the debacle at Taranto and the Battle of Cape Matapan.

Development and production of the Airone continued, with small modifications being introduced with each new production batch (*serie*), of which Serie XII was the most important. A special air-sea rescue conversion was the **Z.506S** (Soccorso), this version being also used in small numbers by the Luftwaffe. After the Italian surrender 23 Z.506B and five Z.506S aircraft were flown to Allied ports and subsequently flew with the Co-Belligerent Air Force's Raggruppamento Idro, performing transport and other second-line tasks.

Specification

Cant Z.506B Serie XII

Type: five-seat bomber and torpedo-bomber floatplane

Powerplant: three 559-kW (750-hp) Alfa-Romeo 126RC.34 radial piston engines

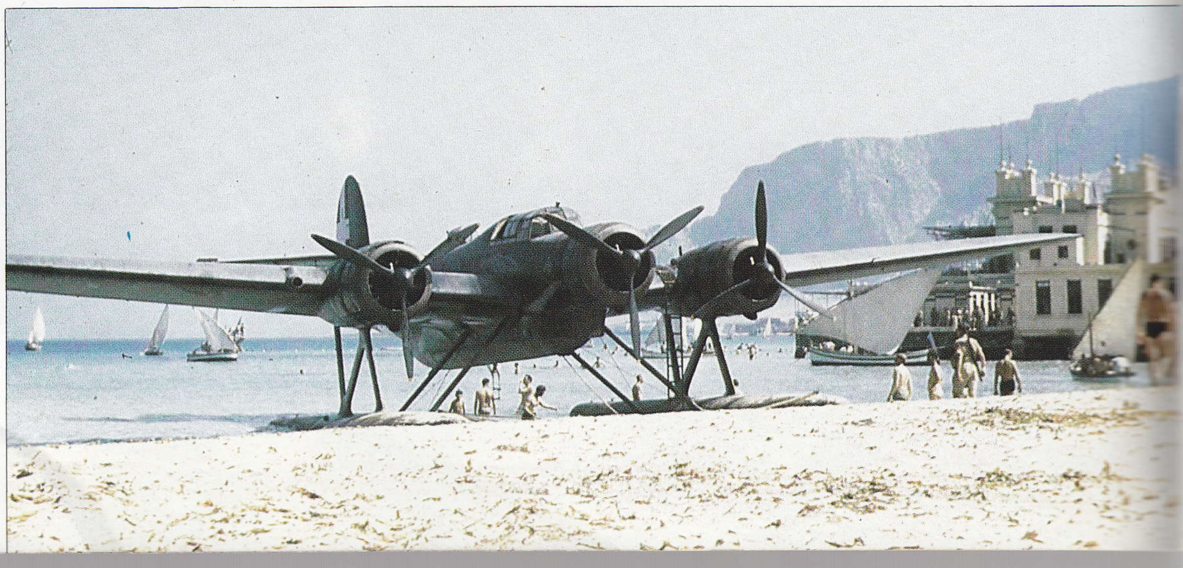
Performance: maximum speed 350 km/h (217 mph) at 4000 m (13,125 ft); climb to 4000 m (13,125 ft) in 20 minutes 6 seconds; service ceiling 7000 m (22,965 ft); range 2000 km (1,243 miles)

Weights: empty 8750 kg (19,290 lb); maximum take-off 12705 kg (28,010 lb)

Dimensions: span 26.50 m (86 ft 11.3 in); length 19.24 m (63 ft 1.5 in); height 7.45 m (24 ft 5.3 in); wing area 86.26 m^2 (928.53 sq ft)

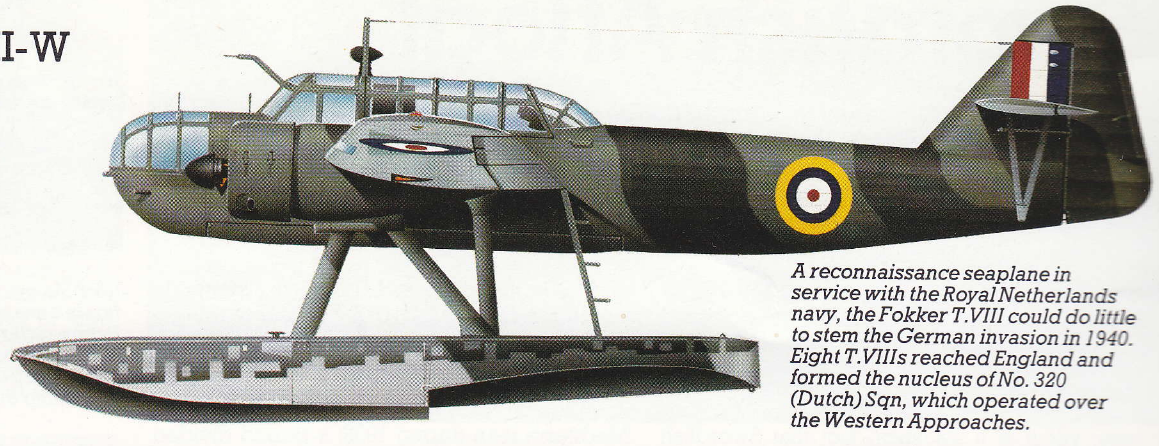
Armament: one 12.7-mm (0.5-in) trainable machine-gun in the dorsal position, and three 7.7-mm (0.303-in) trainable machine-guns in the two beam and one ventral positions, plus a bombload of 1200 kg (2,646 lb) or one 800-kg (1,764-lb) torpedo

The largest operational floatplane of the war was the Cant Z.506, an example of which was forced down at Mondello beach, Sicily, in November, 1943.



NETHERLANDS

Fokker T.VIII-W



A reconnaissance seaplane in service with the Royal Netherlands navy, the Fokker T.VIII could do little to stem the German invasion in 1940. Eight T.VIIIs reached England and formed the nucleus of No. 320 (Dutch) Sqn, which operated over the Western Approaches.

Designed in 1937 to replace ageing reconnaissance/torpedo-bomber biplanes in service with the Dutch Marine Luchtvaardienst (MLD), the twin-engine twin-float **Fokker T.VIII-W** seaplane was of mixed wood and metal construction and accommodated a three-man crew. The aircraft, initially powered by Wright Whirlwind radials, was considered to be very underpowered, but plans to introduce Bristol Mercury engines were effectively overtaken by the German invasion of the Netherlands. The T.VIII-W entered service with the MLD in 1939 and by the time of the German attack the following May 11 aircraft had been delivered (including one that had been shot down in error by the Luftwaffe). Quickly realizing the futility of flying the seaplanes in the presence of the Luftwaffe's fighters, the MLD ordered the nine serviceable aircraft to be flown to French bases on the Channel coast, one aircraft being used to fly two members of the Dutch government to the UK. Arriving in France on 12 May, the T.VIII-Ws flew a number of patrols over the Channel during the following 10 days, but such operations lacked cohesion and purpose as there remained little unified command in the rapidly dwindling air forces in northern France. Therefore, on 22 May, the MLD ordered all surviving Dutch aircrews to fly their aircraft to the UK, a total of eight T.VIII-Ws eventually assembling at Pembroke Dock in South Wales where, on 1 June, these crews formed the nucleus of No. 320 (Dutch) Squadron of the RAF. For two months the Fokkers (carrying the British serials AV958-AV965) flew anti-shipping patrols over the Western Approaches until an increasing lack of spares forced the withdrawal of the Dutch seaplanes in favour of Avro Ansons and Lockheed Hudsons, which were flown from Carew Cheriton.

In the meantime Fokker had, at the time of the German invasion, been producing a larger version of the aircraft, the **T.VIII-W/C**, for Finland; powered by Bristol Mercury XI radials, this aircraft possessed a top speed some 72 km/h (45 mph) faster than the MLD version. In all the Germans took over 20 partially-completed T.VIII-Ws and five T.VIII-W/Cs, these aircraft subsequently being completed by Fokker and entering service with the Luftwaffe on anti-shipping and air-sea rescue duties over the North Sea.

Specification

Fokker T.VIII-W

Type: three-seat reconnaissance and torpedo-bomber floatplane

Powerplant: two 336-kW (450-hp) Wright R-975-E3 Whirlwind radial piston engines

Performance: maximum speed 285 km/h (177 mph) at sea level; service ceiling 6800 m (22,310 ft); range 2100 km (1,305 miles)

Weights: empty 3100 kg (6,834 lb); maximum take-off 5000 kg (11,023 lb)

Dimensions: span 18.00 m (59 ft 0.7 in); length 13.00 m (42 ft 7.8 in); height 5.00 m (16 ft 4.9 in); wing area 44.00 m^2 (473.6 sq ft)

Armament: one fixed forward-firing and two trainable 7.92-mm (0.31-in) machine-guns, plus 605 kg (1,334 lb) of bombs or one torpedo

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UK

Fairey Seafox

Designed to a 1932 specification the **Fairey Seafox** prototype was first flown on 27 May 1936; its operational purpose was to equip Royal Navy trade-protection light cruisers which, in time of war, would patrol the world's oceans on the lookout for enemy surface raiders and blockade runners. Equipped with cross-braced twin-float alighting gear, the Seafox was unable to carry a torpedo (being some 40 per cent lighter than the Swordfish) and its role was entirely passive; its value was, however, accepted as lying in its ability to spot for the cruiser's guns if brought to action by enemy warships. The Seafox was of all-metal structure with monocoque fuselage and fabric-covered wings and tail; it was fully stressed for catapulting and the pilot was accommodated in an open cockpit, his observer being enclosed beneath a glazed canopy.

A total of 64 production Seafoxes was built (K8569-K8617 and L4519-L4533), the first being delivered to the Royal Navy on 23 April 1937; they subsequently served with Nos 702, 713, 714, 716 and 718 Catapult Flights, as well as Nos 753 and 754 Training Squadrons. The Catapult Flights embarked single or pairs of aircraft in ships of the 3rd Cruiser Squadron in the Mediterranean, the 9th Cruiser Squadron and South American Division of the South Atlantic command. At the outbreak of war 32 Seafoxes were at sea with the Royal Navy as well as light cruisers of the Royal Australian Navy and the New Zealand Division of the Royal Navy.

When the German pocket battleship *Admiral Graf Spee* was being hunted in the South Atlantic during November 1939 Seafoxes were in constant use by the British cruisers, and during the Battle of the River Plate the light cruiser HMS *Ajax* launched one of her two aircraft for gunnery spotting, although difficulty was experienced with the air-to-ship radio contact. Later the Seafox crew kept a watch on Montevideo harbour while the *Graf Spee* was seeking shelter from British warships before her scuttling. Seafoxes continued to serve at sea until 1943, two aircraft being lost when the 'Ajax'-class cruiser HMS *Orion* was severely damaged by German air attack during the evacuation of Crete on 28 April 1941.

Specification

Fairey Seafox

Type: two-seat light fleet reconnaissance floatplane

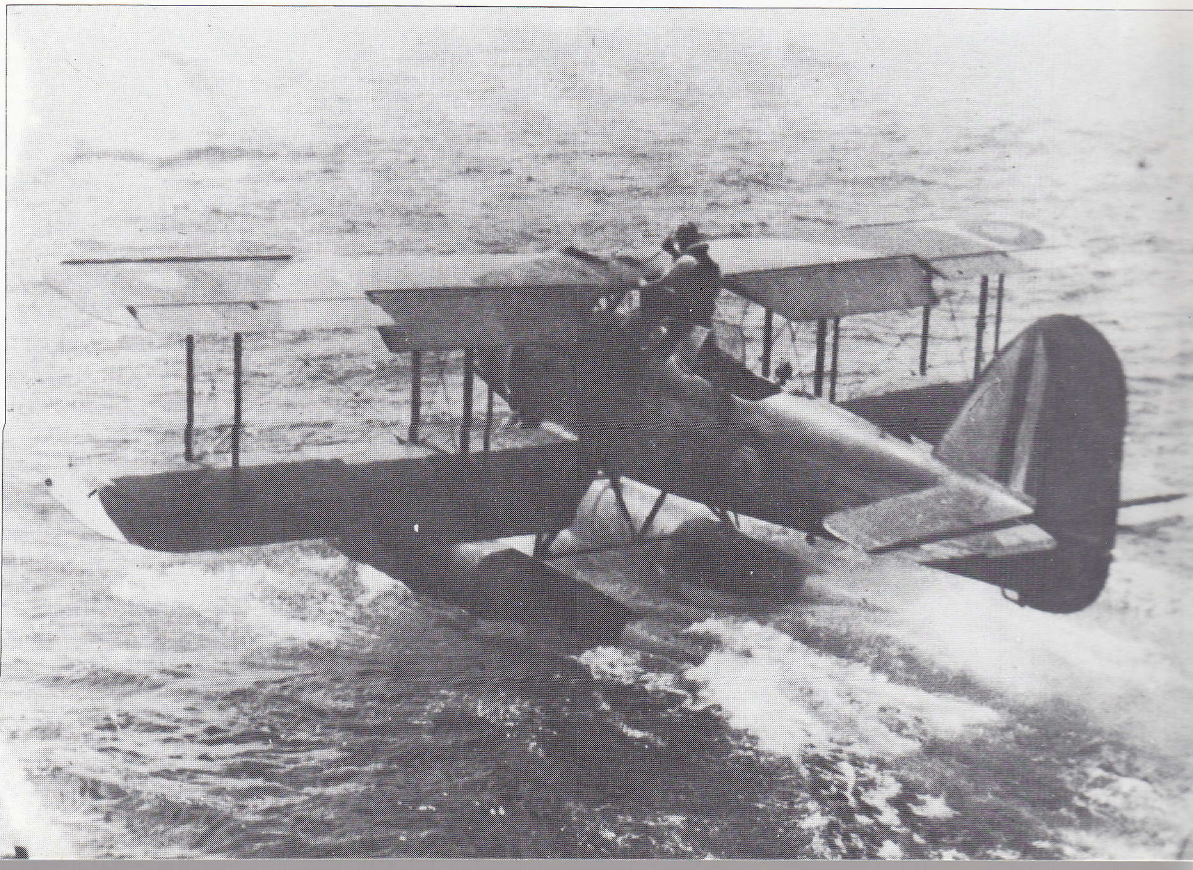
Powerplant: one 295-kW (395-hp) Napier Rapier VI inline piston engine

Performance: maximum speed 200 km/h (124 mph) at 1785 m (5,860 ft); climb to 1525 m (5,000 ft) in 10 minutes 24 seconds; service ceiling 3355 m (11,000 ft); range 708 km (440 miles)

Weights: empty 1726 kg (3,805 lb); maximum take-off 2459 kg (5,421 lb)

Dimensions: span 12.19 m (40 ft 0 in); length 10.81 m (35 ft 5.5 in); height 3.68 m (12 ft 1 in); wing area 40.32 m^2 (434 sq ft)

Armament: provision for one 7.7-mm (0.303-in) Lewis gun in the rear cockpit; some aircraft were adapted to carry underwing racks for flares or four 9-kg (20-lb) bombs



Fairey Seafoxes were embarked on Royal Navy cruisers of the 3rd and 9th Squadrons as well as those of the South American division of South Atlantic Command. HMS Ajax *launched one of hers during the fight with KMS* Graf Spee.

Swordfish Afloat

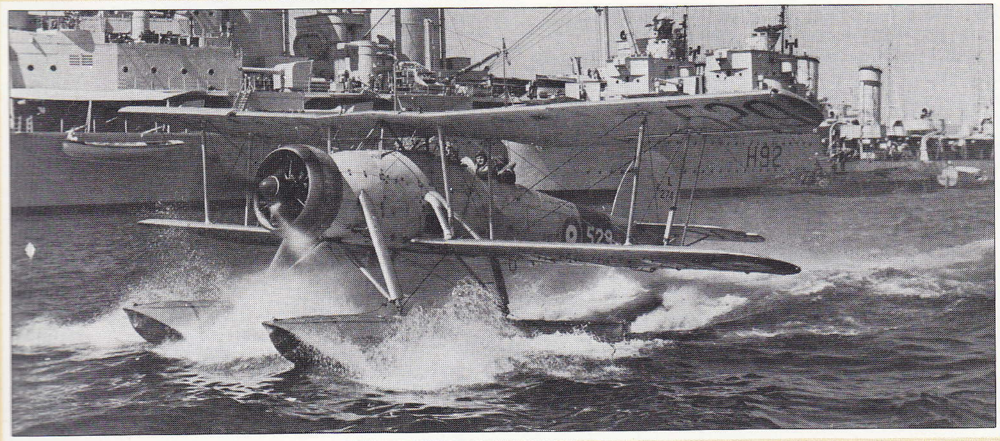
The Swordfish is famous as the aircraft that shattered the Italian fleet at Taranto and scored more torpedo hits than any other carrierborne aircraft. The fame of the Swordfish as a torpedo bomber has tended to obscure the fact that it also achieved considerable success as a seaplane, the flight aboard the battleship HMS Warspite *serving with distinction from Norway to the Mediterranean.*

The exploits and achievements of the Fairey Swordfish during World War II have passed into aviation history as epics of tremendous gallantry by the crews of this old biplane, and the 'Stringbag' represented what was perhaps the most extraordinary anachronism of the air war, yet it is a statistical fact that Swordfish biplanes scored more torpedo hits on naval targets during World War II than any other carrierborne aircraft of any navy. Far less chronicled were the activities of the Swordfish seaplanes which the Royal Navy embarked in some of its capital ships, of which the aircraft of the battleship HMS *Warspite* must reign supreme.

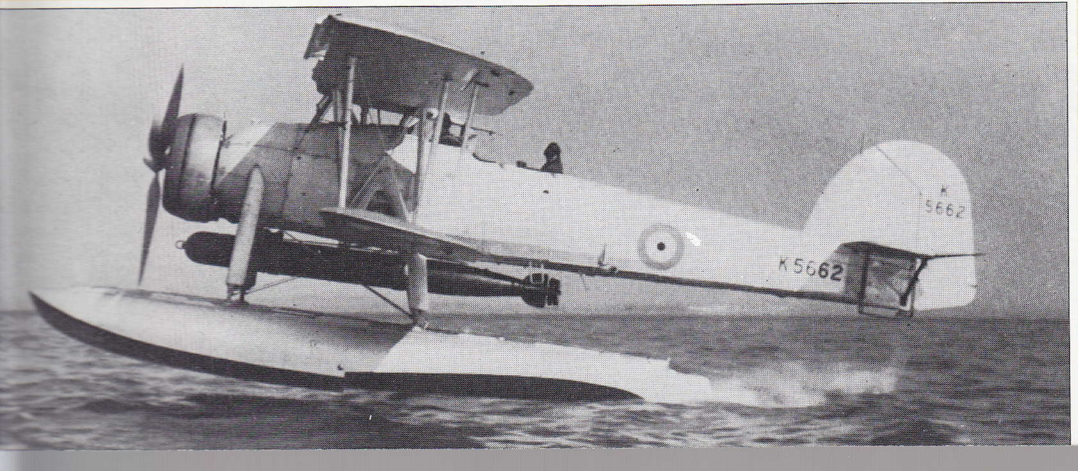
Warspite was laid down on 31 October 1912 and joined Admiral Jellicoe's Grand Fleet on 13 April 1915, being present with the 5th Battle Squadron during the great Battle of Jutland on 31 May 1916 and receiving a number of heavy hits. Between the world wars the battleship underwent several refits, that of 1926 involving the removal of her aircraft catapult. In 1934 there started a major modernization programme for British battleships, of which the *Warspite* was the first to refit at a cost of £2,360,000, including the return of an aircraft catapult; a hangar was constructed on the upper deck abaft the funnel to accommodate a pair of Swordfish seaplanes, and two electric cranes were added to recover the aircraft from the sea and hoist them inboard. When the *Warspite* recommissioned in 1937 her company included about a dozen airmen and maintenance crew from the Fleet Air Arm.

Her first appointment after refit was as Admiral Sir Dudley Pound's flagship in the Mediterranean during 1938, a period divided between 'showing the flag' at foreign ports and working up her efficiency at sea. In August that year the *Warspite* carried out main armament firings at a range of 24 km (15 miles) against towed targets which, thanks to excellent spotting by Lieutenant Commander W.L.M. Brown in one of the Swordfish, were reduced to matchwood by some 40 salvoes from the battleship's eight 381-mm (15-in) guns.

After the outbreak of war the *Warspite* returned to home waters and by March 1940 was with the Home Fleet at Scapa Flow. When Germany attacked Norway she had just set sail for the Mediterranean but was recalled to join Admiral Sir Charles Forbes who sailed for Narvik on 7 April. Apart from an unsuccessful attack by German dive-bombers on 10 April the *Warspite* was not involved in the 1st Battle of Narvik, but two days later Admiral Forbes decided to send her into Narvik Fjord with nine destroyers under the command of Vice Admiral Sir William Whitworth in an attempt to finish off the eight modern 127-mm (5-in) gun German destroyers believed to be in the vicinity.



Above: A Fairey Swordfish floatplane taxis past the ill-fated battlecruiser HMS Hood *and several 'E' class destroyers. HMS* Warspite *carried a pair of Swordfish floatplanes in a hangar mounted abaft her funnel, plus two electric hoists to retrieve them.*



Below: The Fairey Swordfish could carry a single 457-mm (18-in) torpedo or up to 680 kg (1,500 lb) of bombs or depth-charges. Swordfish biplanes scored more torpedo hits on naval targets than any other carrierborne aircraft of World War II.

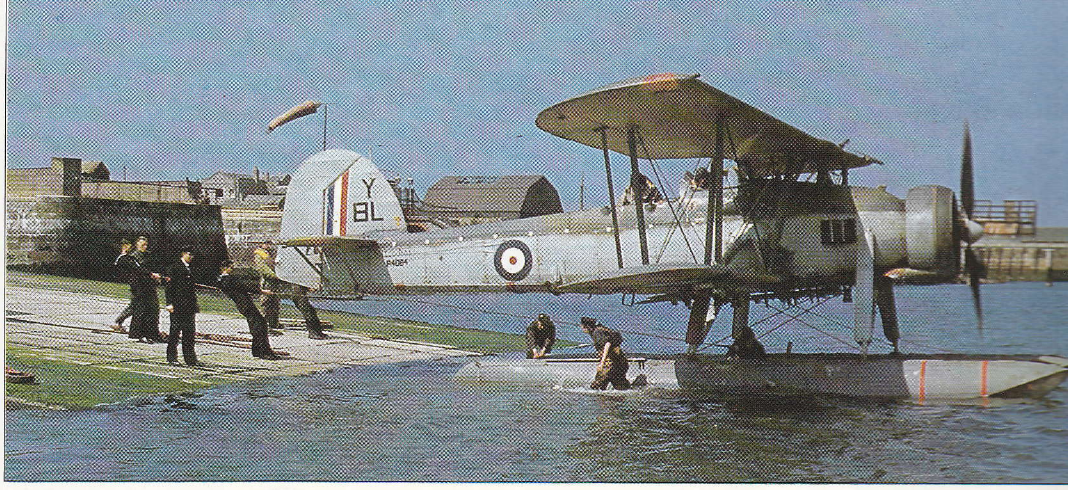
HMS Malaya *hoists one of her Swordfish floatplanes aboard after a reconnaissance flight. Before radar-directed gunnery had been perfected, battleship floatplanes were also used to spot the fall of shot of the big guns, greatly extending their effective range.*

As the *Warspsite* sailed past the island of Baröy at 12.30 on 13 April she launched one of her Swordfish, crewed by Lieutenant Commander W.M.L. Brown (captain and observer), Petty Officer Airman R.C. Rice (pilot) and Telegraphist M.G. Pacey, and armed with six 113-kg (250-lb) bombs to scout ahead. Almost immediately Brown spotted the destroyers *Erich Koellner* and *Erich Giese* in Ofotfjord, and then flew into Herjangsfjord where the U-boat *U-64* was sighted and attacked with bombs at Bjerkvik; the submarine was sunk, although the aircraft suffered slight damage from return gunfire. On returning to Ofotfjord Brown discovered that the *Erich Koellner* was manoeuvring to bring her torpedo tubes to bear on the *Warspite*, and so commenced directing the battleship's fire against this target. Soon after 13.20 the German ship was overwhelmed and sunk.

The Swordfish then flew back towards Narvik, directing the *Warspite*'s guns against the *Erich Giese* and *Diether von Röder* off Narvik itself, and the *Hermann Künne* in Herjangsfjord. By 15.15, after the Swordfish had been airborne for nearly three hours, the *Warspite* and eight destroyers (HMS *Cossack* had gone aground an hour earlier) arrived at the entrance to Rombaksfjord where the last four German destroyers, *Georg Thiele, Wolfgang Zenker, Bernd von Arnim* and *Hans Lüdemann* were brought to action and destroyed; one of them (it is not known which) was attacked and finished off with the Swordfish's last two bombs. In his subsequent despatches Admiral Whitworth wrote 'The reports made by *Warspite*'s aircraft were invaluable. I doubt if ever a shipborne aircraft has been used to such good purpose as it was on this occasion.'

Self-inflicted damage

The battleship had suffered little damage during the 2nd Battle of Narvik, most of it caused by blast from her own great guns; one of the Swordfish seaplanes was replaced when *Warspite* returned to Scapa Flow, but the aircrew that had performed so well off Narvik remained aboard when the ship sailed for Gibraltar at the end of April. She was present at the naval action off the Calabrian coast on 9 July 1940 when Admiral Cunningham with three battleships, an aircraft carrier (HMS *Eagle*), four cruisers and three flotillas of destroyers engaged two Italian battleships, 16 cruisers and 32 destroyers. Once again the *Warspite* launched a Swordfish with Brown aboard, the crew sighting the Italian fleet and so accurately spotting for the British guns that the battleship was able to obtain a direct hit amidships from a range of 23775 m (26,000 yards) on the battleship *Giulio Cesare*, causing considerable damage, putting four boilers out of action, inflicting 115 casualties and reducing the ship's speed. At once the Italians made smoke to

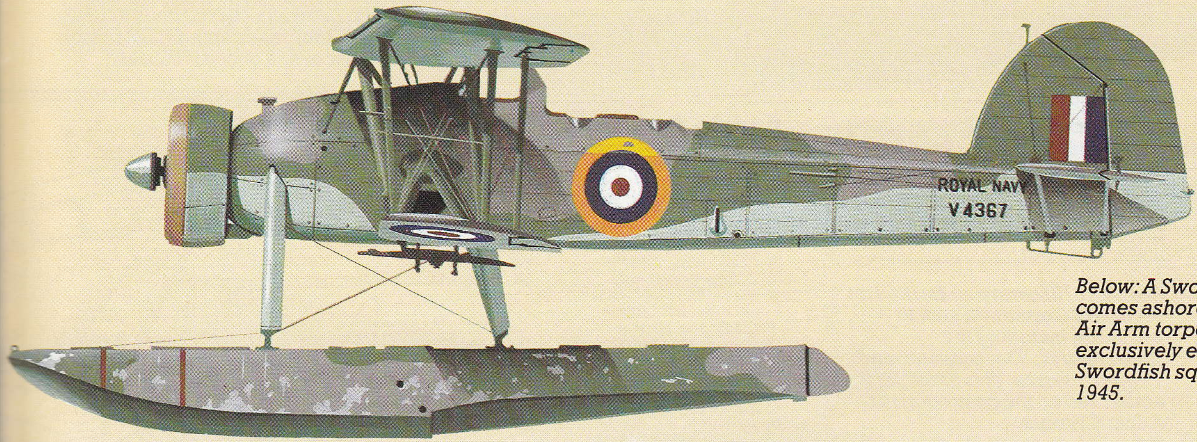


A Swordfish Mk I is launched from the shore; the apparatus under the fuselage is the rack for the torpedo. The failure of the Swordfish attack on German heavy units involved in 'the Channel Dash' led to the aircraft's redeployment to anti-submarine warfare duties.

cover the withdrawal of their battleships and 10 of the cruisers, leaving the remaining ships to engage the British fleet. When Italian aircraft appeared on the scene the majority of their torpedoes were directed at their own ships. Once again a British admiral recorded unstinted praise for the actions of the *Warspite*'s seaplane.

The *Warspite* and her Swordfish continued to be heavily committed in the Mediterranean, as when the battleship bombarded the fortifications at Bardia on 17 August, and again on 2 January 1941. At the Battle of Cape Matapan the *Warspite* was Admiral Cunningham's flagship as she sailed northward towards Crete on 28 March of that year. Knowing that heavy Italian naval forces were at sea, Cunningham had launched one of the Swordfish, with Brown's crew, for gunnery spotting in the event of a fleet action. However, it was her other Swordfish, captained by Lieutenant Commander A.S. Bolt, that was catapulted off at 17.45 and whose crew spotted the Italian fleet and passed its composition and movement to the British admiral, the first such truly accurate reports he received. As night approached both seaplanes returned to *Warspite* and were hoisted inboard, their task completed. Subsequently, referring to the work of Bolt, the Italian commander-in-chief Admiral Iachino expressed his envy and admiration of the British airman's reports, for he himself had been totally unaware that Cunningham's battle squadron was even at sea let alone in pursuit of his own ships.

Shortly afterwards *Warspite* was severely damaged off Crete and had to be withdrawn for lengthy repairs. By the time she returned to active duty carrierborne forces had been considerably increased and much-improved radar introduced into the fleet, so that seldom was so much reliance placed on the use of the ancient Swordfish seaplanes.



Left: A Fairey Swordfish of the Catapult Flight, HMS Malaya, *in 1940. The 'Queen Elizabeth' class battleships* Malaya *and* Warspite *both carried Swordfish until 1943, when the installation of effective radar rendered them superfluous.* Warspite*'s Swordfish destroyed the first U-boat to be credited to the Fleet Air Arm.*

Below: A Swordfish floatplane of the Fleet Air Arm comes ashore after a training flight. By 1939 Fleet Air Arm torpedo bomber squadrons were exclusively equipped with the Swordfish and nine Swordfish squadrons were still operational in 1945.

GERMANY

Arado Ar 196

Although the attractive **Arado Ar 196** twin-float seaplane was frequently encountered by Allied aircraft around the coasts of Europe during World War II, it had originally been developed to replace the Heinkel He 60 float biplane aboard Germany's larger warships whose construction was advancing apace during the late 1930s. Of all-metal structure with metal and fabric covering, the Ar 196 was by all accounts an extremely pleasant aeroplane to fly, the crew being afforded excellent fields of view. After first flights by the four prototypes in 1938 (of which one featured a single central float and small underwing outrigger floats), the first service deliveries of the **Ar 196A-1** were made in July 1939, in time to embark examples in the pocket battleships *Deutschland* and *Admiral Graf Spee* before they sailed for their war stations in August. During the following six weeks 18 Ar 196s were embarked in the battlecruisers *Scharnhorst* and *Gneisenau*, the pocket battleship *Admiral Scheer*, the heavy cruiser *Admiral Hipper* at Kiel and the light cruisers *Emden, Köln, Königsberg, Leipzig* and *Nürnberg* at Wilhelmshaven.

The *Deutschland* made constant use of her aircraft during her early foray into the Atlantic (which resulted in the sinking of nine merchantmen), as did the *Scharnhorst* and *Gneisenau* during their sortie northwards late in November, but the *Graf Spee* did not attempt to launch her aircraft during the Battle of the River Plate because of the difficulty of its recovery during the chase by the British cruisers; in any case her guns were apparently adequately served by radar. During the pursuit of the battleship *Bismarck* in May 1941, which led ultimately to her destruction, at least two Ar 196s were launched in attempts to prevent RAF Consolidated Catalinas from shadowing the warship.

In 1940 the Ar 196A entered service with Luftwaffe coastal units throughout northern Europe, and an aircraft of Küstenfliegergruppe 706 attacked and damaged the submarine HMS *Seal* in the Kattegat, leading to the boat's capture by the Germans. Although several Ar 196s were shot down by the RAF during the Battle of Britain, most losses were attributable to storms at their anchorages. In 1941-2, flown from French bases, they were used to intercept RAF Coastal Command anti-submarine patrols over the Bay of Biscay, their pilots claiming more than a dozen victories. Total production amounted to 593 aircraft.

Specification

Arado Ar 196A-3

Type: two-seat shipborne and coastal patrol floatplane

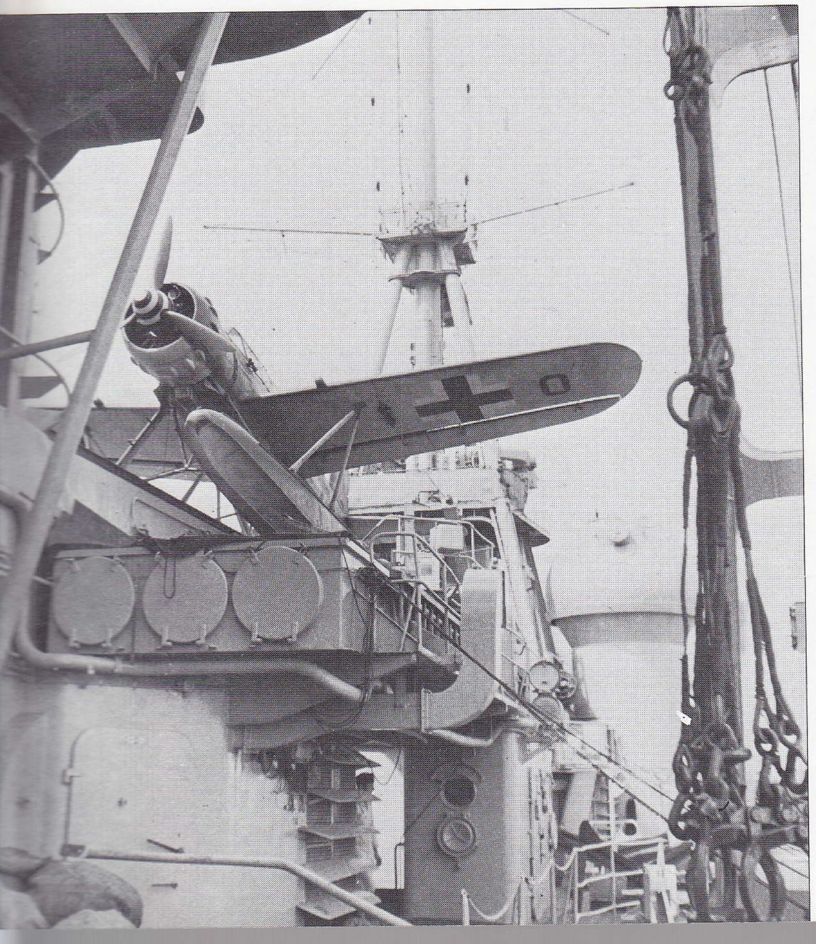
Powerplant: one 723-kW (970-hp) BMW 132K radial piston engine

Performance: maximum speed 310 km/h (193 mph) at 4000 m (13,125 ft); climb to 3000 m (9,845 ft) in 8 minutes 42 seconds; service ceiling 7020 m (23,030 ft); range 1070 km (665 miles)

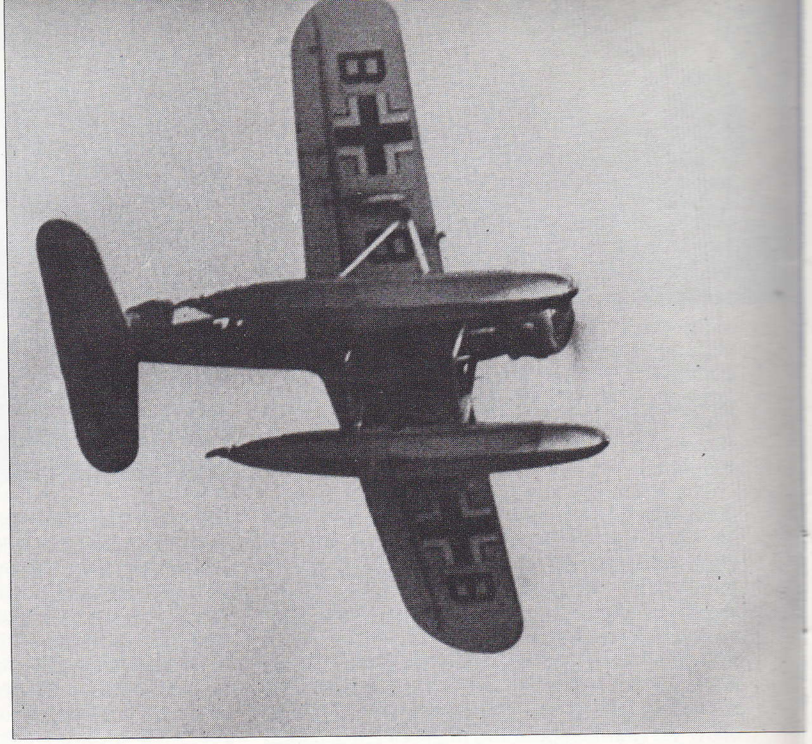
Weights: empty 2335 kg (5,148 lb); maximum take-off 3303 kg (7,282 lb)

Dimensions: span 12.40 m (40 ft 8.2 in); length 11.00 m (36 ft 1.1 in); height 4.45 m (14 ft 7.2 in); wing area 28.3 m^2 (304.62 sq ft)

Armament: two fixed forward-firing 20-mm cannon and one fixed forward-firing 7.92-mm (0.31-in) machine-gun, and two 7.92-mm (0.31-in) trainable machine-guns in the rear cockpit, plus provision for two 50-kg (110-lb) bombs under the wings



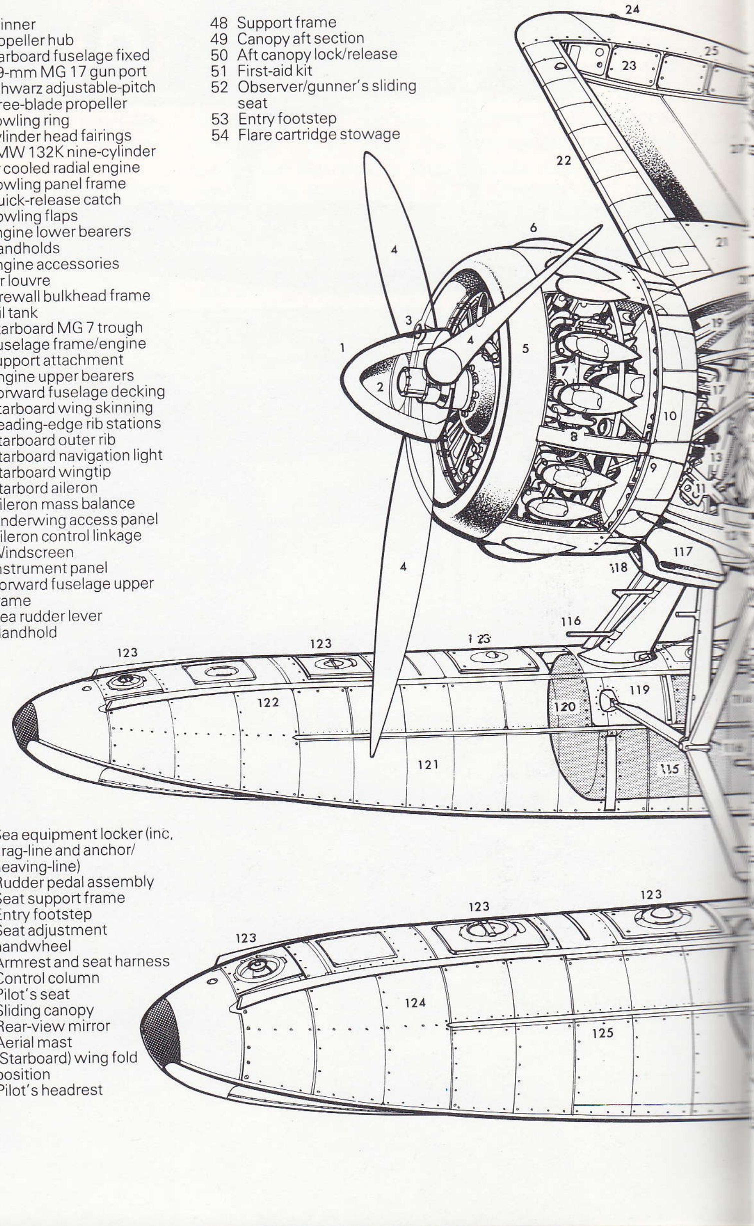
Arado Ar 196s were embarked on several of Germany's major warships, including the 'Scharnhorst', 'Deutschland' and 'Hipper' classes. This example is embarked on the heavy cruiser Admiral Hipper.



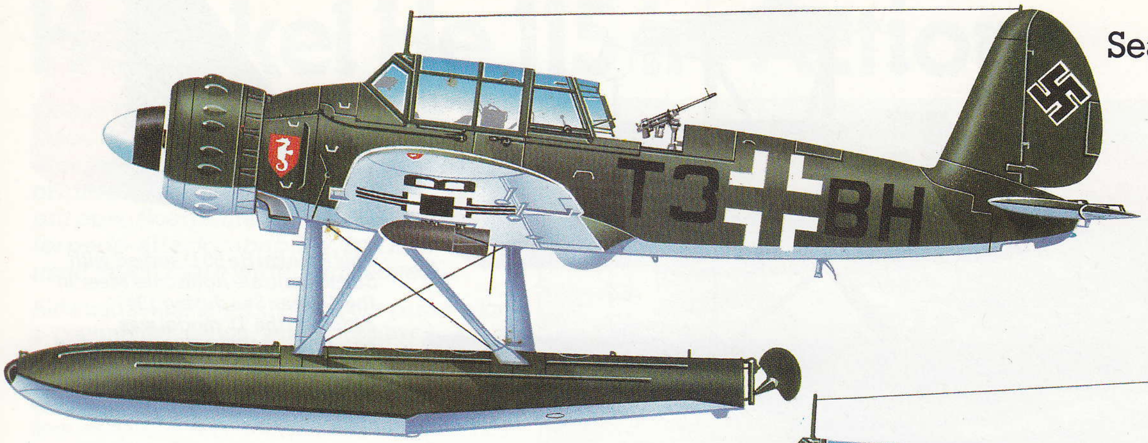
Designed to replace the Heinkel He 60 floatplane aboard German warships, the Arado Ar 196 was pressed into service with Luftwaffe coastal units in 1940. Flying from French bases during 1941 and 1942, they intercepted ASW patrols mounted by RAF Coastal Command and claimed over a dozen victories.

Arado Ar 196A-3 cutaway drawing key

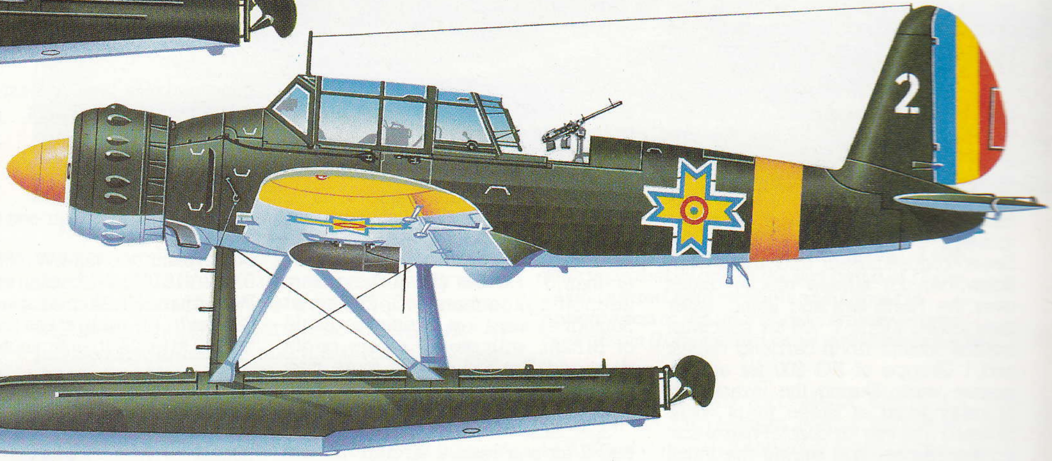
1 Spinner
2 Propeller hub
3 Starboard fuselage fixed 7.9-mm MG 17 gun port
4 Schwarz adjustable-pitch three-blade propeller
5 Cowling ring
6 Cylinder head fairings
7 BMW 132K nine-cylinder air cooled radial engine
8 Cowling panel frame
9 Quick-release catch
10 Cowling flaps
11 Engine lower bearers
12 Handholds
13 Engine accessories
14 Air louvre
15 Firewall bulkhead frame
16 Oil tank
17 Starboard MG 7 trough
18 Fuselage frame/engine support attachment
19 Engine upper bearers
20 Forward fuselage decking
21 Starboard wing skinning
22 Leading-edge rib stations
23 Starboard outer rib
24 Starboard navigation light
25 Starboard wingtip
26 Starbord aileron
27 Aileron mass balance
28 Underwing access panel
29 Aileron control linkage
30 Windscreen
31 Instrument panel
32 Forward fuselage upper frame
33 Sea rudder lever
34 Handhold
35 Sea equipment locker (inc, drag-line and anchor/heaving-line)
36 Rudder pedal assembly
37 Seat support frame
38 Entry footstep
39 Seat adjustment handwheel
40 Armrest and seat harness
41 Control column
42 Pilot's seat
43 Sliding canopy
44 Rear-view mirror
45 Aerial mast
46 (Starboard) wing fold position
47 Pilot's headrest
48 Support frame
49 Canopy aft section
50 Aft canopy lock/release
51 First-aid kit
52 Observer/gunner's sliding seat
53 Entry footstep
54 Flare cartridge stowage



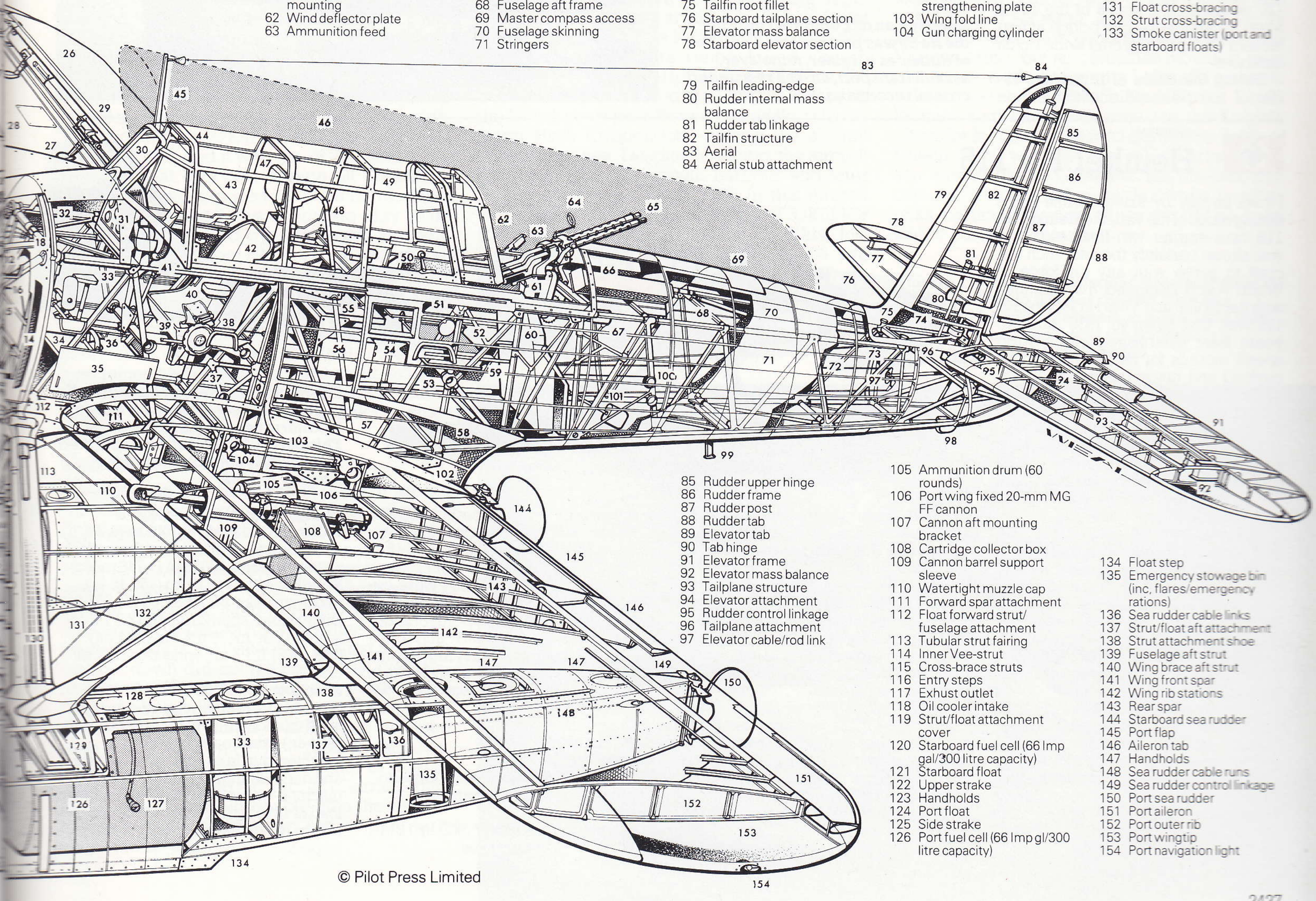
Seaplanes of World War II



Left: An Arado Ar 196A-3 of 1./Bordfliegergruppe 196, based on the Lofoten Islands in February 1944. A pleasant machine to fly, the Ar 196 afforded excellent fields of vision and achieved considerable success. One aircraft of Küstenfliegergruppe 706 crippled the submarine HMS Seal, *leading to the boat's capture by the Germans.*



Right: Arados were exported to two of Germany's Balkan allies; this aircraft belongs to Romanian Escadrilla 102, operating from the Black Sea port of Odessa in 1943. Others served with the Royal Bulgarian air force's 161st Coastal Squadron, based at Varna.



55 Chart table
56 Radio equipment
57 Fuselage frame/aft spar attachment
58 Wingroot fillet
59 Observer's sliding seat port runner
60 Ammunition box
61 Dorsal gun swivel mounting
62 Wind deflector plate
63 Ammunition feed
64 Ring sight
65 Twin 7.9-mm MG 81Z flexible machine-guns
66 Flare bomb stowage
67 Gun support bracket
68 Fuselage aft frame
69 Master compass access
70 Fuselage skinning
71 Stringers
72 Elevator control cable linkage
73 Rudder controls
74 Tailfin/fuselage support/attachment bracket
75 Tailfin root fillet
76 Starboard tailplane section
77 Elevator mass balance
78 Starboard elevator section
79 Tailfin leading-edge
80 Rudder internal mass balance
81 Rudder tab linkage
82 Tailfin structure
83 Aerial
84 Aerial stub attachment
85 Rudder upper hinge
86 Rudder frame
87 Rudder post
88 Rudder tab
89 Elevator tab
90 Tab hinge
91 Elevator frame
92 Elevator mass balance
93 Tailplane structure
94 Elevator attachment
95 Rudder control linkage
96 Tailplane attachment
97 Elevator cable/rod link
98 Tie-down lug
99 Catapult attachment
100 Control leads
101 MG 81Z counterbalance
102 Wing attachment strengthening plate
103 Wing fold line
104 Gun charging cylinder
105 Ammunition drum (60 rounds)
106 Port wing fixed 20-mm MG FF cannon
107 Cannon aft mounting bracket
108 Cartridge collector box
109 Cannon barrel support sleeve
110 Watertight muzzle cap
111 Forward spar attachment
112 Float forward strut/fuselage attachment
113 Tubular strut fairing
114 Inner Vee-strut
115 Cross-brace struts
116 Entry steps
117 Exhust outlet
118 Oil cooler intake
119 Strut/float attachment cover
120 Starboard fuel cell (66 Imp gal/300 litre capacity)
121 Starboard float
122 Upper strake
123 Handholds
124 Port float
125 Side strake
126 Port fuel cell (66 Imp gl/300 litre capacity)
127 Vent pipe
128 Filler access cap
129 Strut/float forward attachment
130 Fuel lines (feed and return)
131 Float cross-bracing
132 Strut cross-bracing
133 Smoke canister (port and starboard floats)
134 Float step
135 Emergency stowage bin (inc, flares/emergency rations)
136 Sea rudder cable links
137 Strut/float aft attachment
138 Strut attachment shoe
139 Fuselage aft strut
140 Wing brace aft strut
141 Wing front spar
142 Wing rib stations
143 Rear spar
144 Starboard sea rudder
145 Port flap
146 Aileron tab
147 Handholds
148 Sea rudder cable runs
149 Sea rudder control linkage
150 Port sea rudder
151 Port aileron
152 Port outer rib
153 Port wingtip
154 Port navigation light

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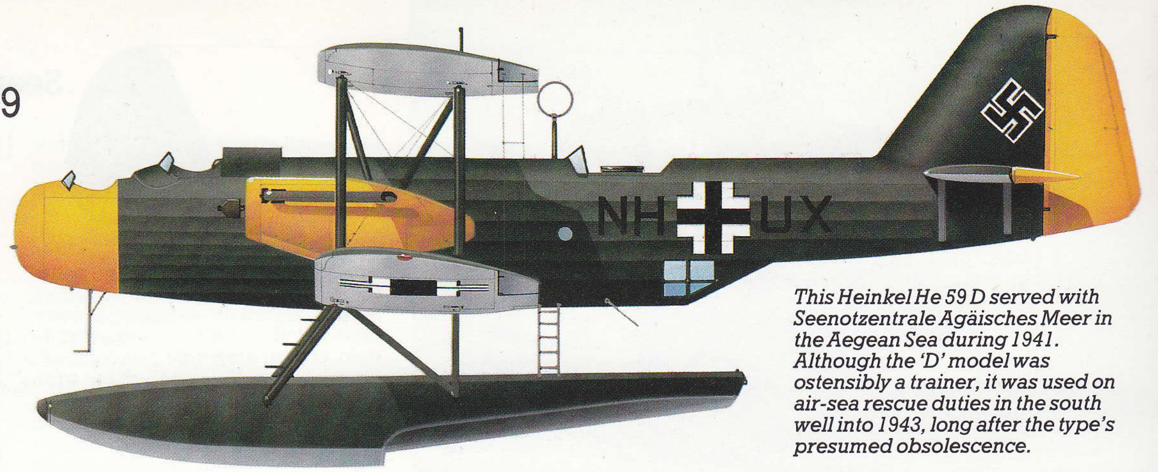
GERMANY

Heinkel He 59

The Germans' use of float seaplanes to deliver combat troops into action is believed to have been unique during World War II, and principally involved the large **Heinkel He 59** two-float twin-engine biplane, an aircraft designed back in 1930 as a reconnaissance bomber landplane during the clandestine activities which eventually resulted in the creation of the Luftwaffe. The first floatplane example made its maiden flight in January 1932 and the first major production version, the **He 59B-2**, saw operational service in Spain with the Legion Condor as a night bomber and for coastal patrol.

By the outbreak of war about 70 He 59Bs had been completed and served with the third *Staffeln* of Küstenfliegergruppen 106, 406, 506 and 706 for coastal reconnaissance, anti-shipping patrols and minelaying (being capable of carrying two 500-kg/1,102-lb magnetic mines). They also equipped the *Seenotdienststaffeln* and the Staffel Schwilben for air-sea rescue duties over the North Sea and Baltic. Later they joined KGrzbV 108 for specialist coastal assault troop-carrying duties, and I Gruppe of KG 200 for air-sea rescue work. During the invasion of Norway most of these units were pressed into use for coastal patrol and air-sea rescue, and during the initial assault phase were occasionally employed to deliver assault parties into the fjords. During the German assault in the West on 10 May 1940 12 He 59Bs of the Staffel Schwilben transported 120 troops to the banks of the River Maas to capture the key bridge at Rotterdam, losing four aircraft to the Dutch defences.



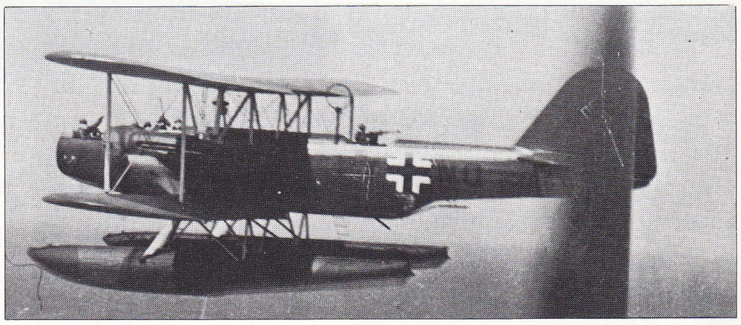
This Heinkel He 59 D served with Seenotzentrale Agäisches Meer in the Aegean Sea during 1941. Although the 'D' model was ostensibly a trainer, it was used on air-sea rescue duties in the south well into 1943, long after the type's presumed obsolescence.

During the Battle of Britain the He 59s of the Seenotdienstkommando were extremely active all round the coasts of the UK, ostensibly on the lookout for downed German aircrew, but when it became apparent that despite displaying prominent Red Crosses the aircraft were being used to shadow and report British convoys, orders were given to RAF pilots to shoot down enemy seaplanes; no fewer than 31 He 59s (11 of them from Seenotflugkommando 3, based at Boulogne) were lost during the Battle of Britain, with seven others badly damaged. Set against this more than 400 German airmen were recovered from the sea round the UK.

Specialist versions included the **He 59C-2** air-sea rescue aircraft, the **He 59D-1** and **He 59N** series trainers, the **He 59E-1** torpedo trainer and **He 59E-2** long-range reconnaissance aircraft. Air-sea rescue He 59s continued to serve in the Mediterranean and Aegean until mid-1943. At least one *Staffel* served on the Black Sea.

Specification
Heinkel He 59B-2

Type: four-seat maritime reconnaissance and air-sea rescue floatplane
Powerplant: two 492-kW (660-hp) BMW VI 6,0ZU V-12 piston engines
Performance: maximum speed 220 km/h (137 mph) at sea level; climb to 1000 m (3,280 ft) in 4 minutes 48 seconds; service ceiling 3475 m (11,400 ft); range 1750 km (1,087 miles)
Weights: empty 5000 kg (11,023 lb); maximum take-off 9100 kg (20,062 lb)
Dimensions: span 23.70 m (77 ft 9 in); length 17.40 m (57 ft 1 in); height 7.10 m (23 ft 3.5 in); wing area 152.8m^2 (1,644.78 sq ft)
Armament: three 7.92-m (0.31-in) trainable machine-guns (one each in the bow, dorsal and ventral positions), plus a load of up to 1000 kg (2,205 lb) of bombs and/or mines or one torpedo



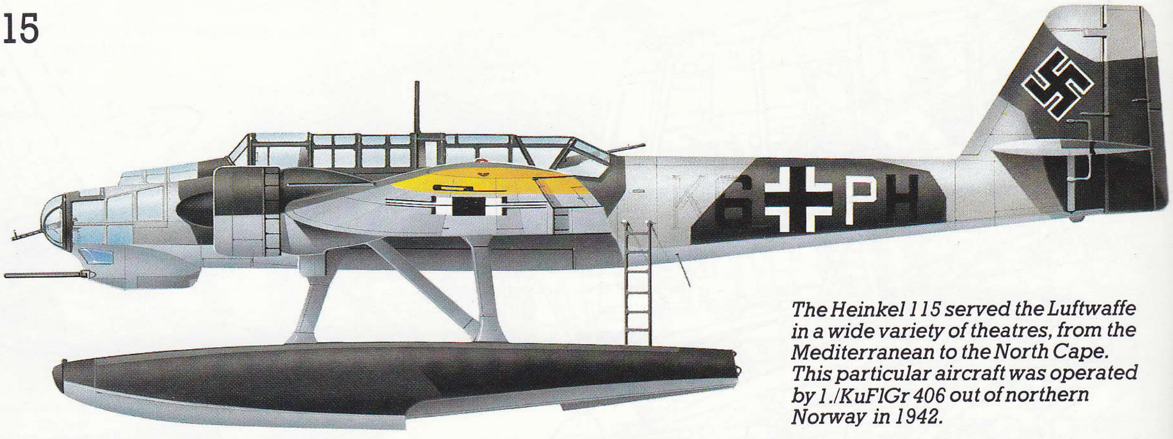
Although an old, outdated design, the He 59 was pressed into a number of duties: as a trainer, minelayer, assault transport, air-sea rescue and coastal reconnaissance aircraft.

GERMANY

Heinkel He 115

Flown largely by Kriegsmarine pilots during much of the war, the **Heinkel He 115** twin-engine two-float seaplane was almost certainly the best such aircraft to serve with any air force in World War II. Designed in competition with the Blohm und Voss Ha 140, the He 115 was first flown in 1936 and two years later established eight world speed records for its class in various payload and range categories. Technically in advance of any British, French or American maritime aircraft of similar concept, the type was ordered into production, the **He 115A-1** version joining the Luftwaffe in 1938 (being followed by the **He 115A-2**, of which six were exported to Norway and 10 to Sweden in 1939).

In September 1939 about 60 He 115A and **He 115B** aircraft (the latter with increased fuel capacity) were serving with the *Küstenfliegergruppen*. Apart from some reconnaissance work over the Baltic during the Polish campaign, their first important task involved sealing the gaps in the minefields along the east coast of the British Isles, the first such mission being flown by 3./KüFlGr 906 on 20/21 November 1939. These activities continued for more than 18 months (and sporadically thereafter for two years), the mining units losing 33 aircraft destroyed and six aircraft severely damaged during the period of the Battle of Britain; most casualties were suffered from British coastal flak.



The Heinkel 115 served the Luftwaffe in a wide variety of theatres, from the Mediterranean to the North Cape. This particular aircraft was operated by 1./KuFlGr 406 out of northern Norway in 1942.

Before the end of the Battle of Britain the first examples of the **He 115C** series were in service with increased defensive armament while the **He 115C-2**, introduced in 1941, featured strengthened floats to allow operation from snow and ice surfaces. The **He 115C-3** and **He 115C-4** were respectively specialist minelayers and torpedo bombers, the latter being flown against the North Cape convoys. Production was halted in 1941 when operations in the USSR made more pressing demands for other aircraft. In 1943 production was resumed and 141 **He 115E** multi-purpose aircraft were delivered to the Luftwaffe in the following year; some He 115Cs and He 115Es were armed with single forward-firing MG 151 20-mm cannon under the nose for flak-suppression during torpedo attacks.

At the end of the Norwegian campaign three of that country's He 115A-2s and a captured He 115B-1 were flown to the UK, where they were evaluated by the RAF before being committed to clandestine operations between the UK and Norway, and in the Mediterranean for carrying agents into enemy-occupied territory in North Africa. Total production was about 500 aircraft.

Specification
Heinkel He 115C-1

Type: three-seat minelaying, torpedo-bombing and reconnaissance floatplane
Powerplant: two 716-kW (960-hp) BME 132K radial piston engines
Performance: maximum speed 300 km/h (186 mph) at 1000 m (3,280 ft); climb to 1000 m (3,280 ft) in 5 minutes 6 seconds; range 2800 km (1,740 miles)
Weights: empty 6870 kg (15,146 lb); maximum take-off 10680 kg (23,545 lb)
Dimensions: span 22.28 m (73 ft 1.2 in); length 17.30 m (56 ft 9.1 in); height 6.59 m (21 ft 7.5 in); wing area 86.7 m^2 (933.26 sq ft)
Armament: one 7.92-mm (0.31-in) trainable machine-gun and one 15-mm fixed cannon in the nose, one 7.92-mm (0.31-in) fixed rearward-firing machine-gun in each engine nacelle, and one 7.92-mm (0.31-in) trainable machine-gun in the rear cockpit, plus a load of 1250 kg (2,756 lb) of bombs and/or mines, or one 500-kg (1,102-lb) torpedo

Heinkel He 115 in Action

One of the most successful of all the large floatplanes operated during World War II, the Heinkel He 115 was originally conceived as a general-purpose floatplane with emphasis on torpedo-attack capability, but found itself much more widely employed.

A 'Weser' Flugzeugbau-built He 115B-1 is seen during pre-delivery trials in the spring of 1940. This is probably one of the last batch of 18 He 115B-1s fitted with strengthened floats in anticipation of the invasion of Norway, where operations from ice and snow could be expected.

Although seemingly something of a paradox for a continental nation with a relatively short coastline (which of course underwent considerable lengthening), Germany's use of the excellent Heinkel He 115 twin-engine twin-float seaplane was both extensive and long-lived. Its three spheres of operation in which greatest interest must lie were its minelaying activities, its use as a torpedo-carrying attack aircraft and, surprisingly, operation by the Allies for clandestine work against enemy-occupied shores.

Although much experimental work had been carried out by British scientists on magnetic sea mines before World War II, the use of such mines by the Germans in 1939 came as an unpleasant surprise, particularly as the war was scarcely 10 weeks old when German seaplanes started laying the weapons at night in the approaches to British ports on the east coast, operations which the RAF was powerless to prevent as it was very poorly equipped with night-fighters. Such airborne radar that existed was utterly useless below about 2440 m (8,000 ft).

Almost from the beginning of the war German destroyers approached close to the Norfolk and Suffolk coast to lay mines, and on the night of 20/21 November 1939 their work was complemented by the He 115B-1s of 3.Staffel of Küstenfliegergruppe 906, flying from North German bases and dropping six magnetic mines in the Thames estuary and off Harwich. Two nights later 3./KüFlGr 906 was joined by 3./KüFlGr 106, and it was one of the latter unit's Heinkels that dropped a mine off Shoeburyness which lay exposed on a mudbank when the tide receded the following day. The weapon was defused by Lieutenant Commander J.G.D. Ouvry from HMS *Vernon*, who discovered that the German mine was detonated by a change of magnetism in the vertical field (compared with British weapons which required a change in the horizontal field). This information proved vital, as hitherto the German mines had seemed unsweepable and, by the time of Ouvry's discovery, 27 ships (totalling 120,958 tons) had already been sunk by mines during November.

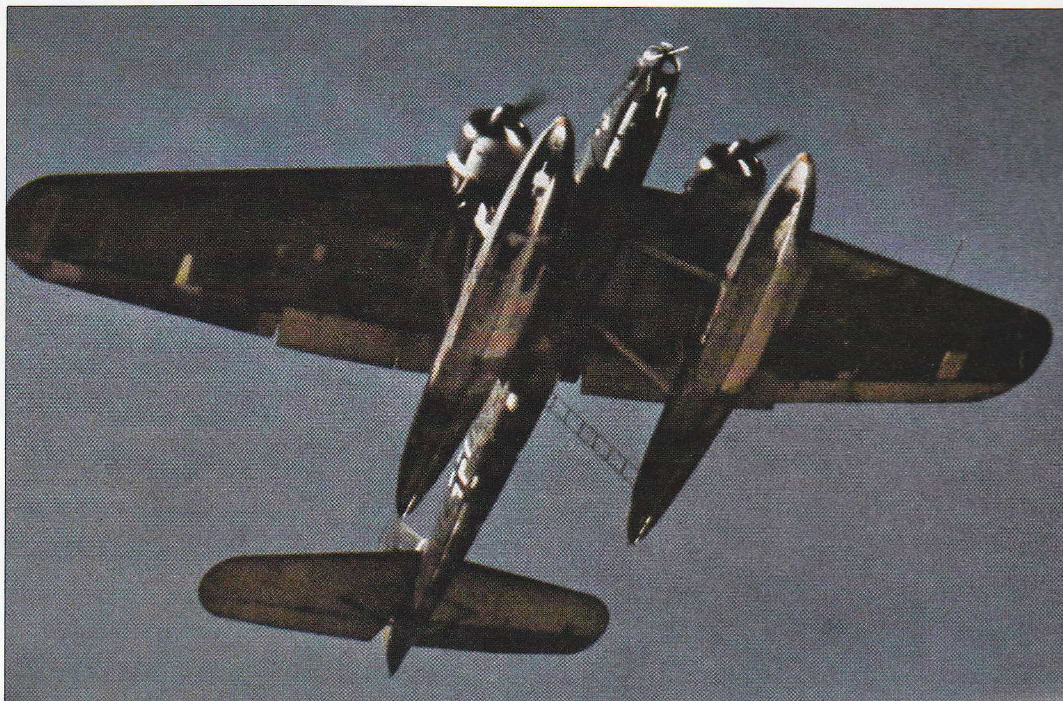
Gun defences alerted

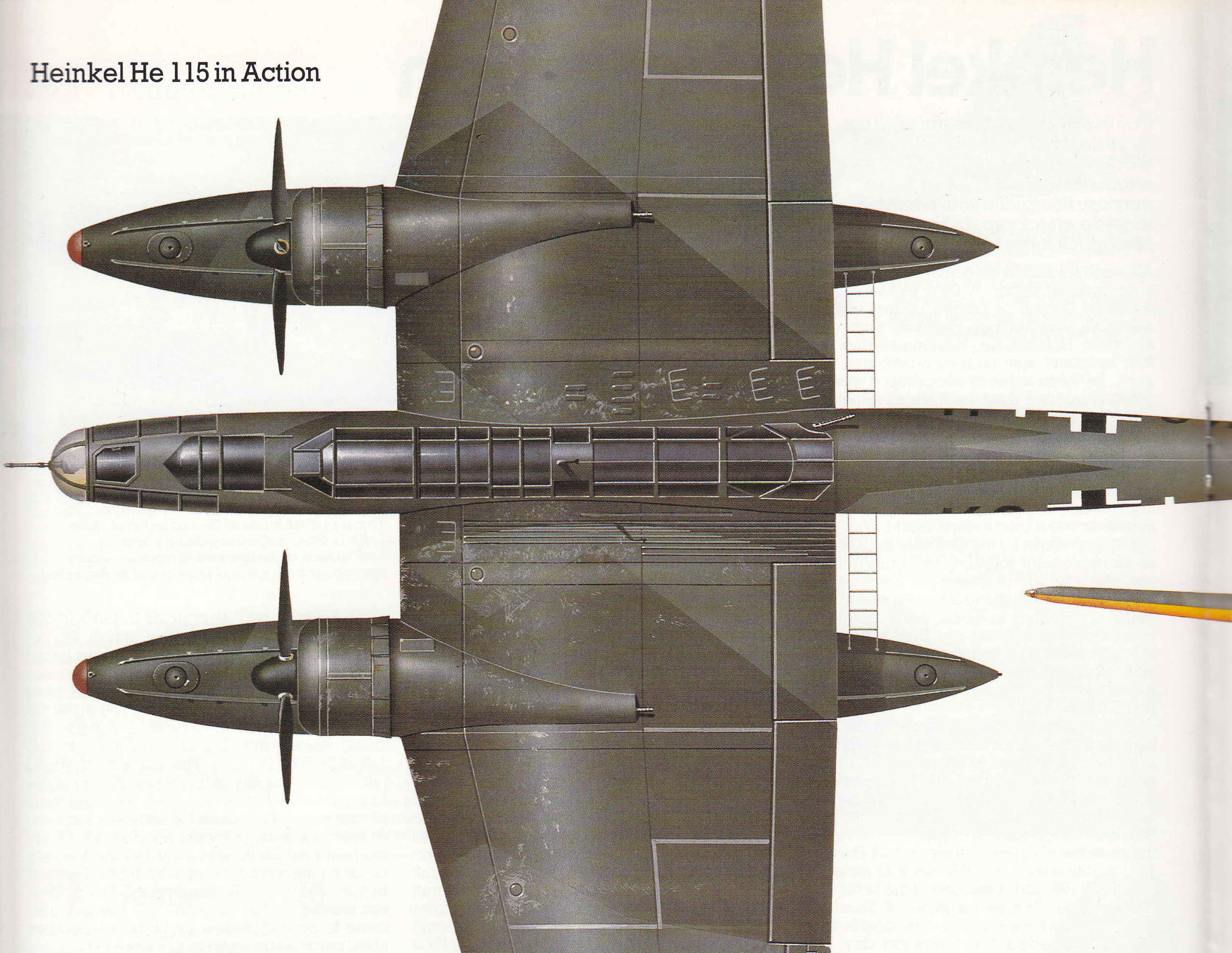
Apart from measures put in hand to render Allied shipping immune to the German mines (by degaussing the ships), British coastal gun defences were alerted to the danger of the Heinkels and all coastal lights (kept burning to assist British ships) were henceforth extinguished. The tasks facing the minelaying *Küstenfliegergruppen* quickly became more difficult and hazardous, although the first He 115 to be shot down did not fall until early 1940, believed brought down by Bofors guns in one of the forts in the Thames estuary. There were also instances of mines, which were dropped from as low as 20 m (60 ft) without parachutes, exploding on contact with the water or a sandbank and destroying the aircraft (German mine fuses were no less unreliable than the Kriegsmarine's torpedo pistols in use at that early stage in the war).

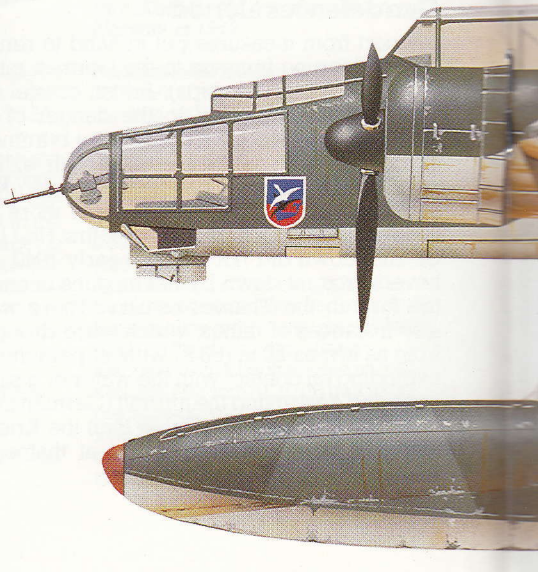
Nevertheless the Küstenfliegergruppen stepped up their mining activity in 1940 and by the time of Germany's invasion of Norway more than 50 He 115s were available whenever weather conditions permitted operations. By July seven *Staffeln* (1. and 3.KüFlGr 106 at Norderney and Schellingwoude, 1., 2. and 3./KüFlGr 506 at Tromso, Bodo and Stavanger, and 1. and 3./KüFlGr 906 at Ijmuiden and elsewhere) were deployed for operations against the UK; air mining had already started in the Western Approaches. The first He 115 known to have been shot down in the Battle of Britain period was an aircraft of 3./KüFlGr 906 flying from Ijmuiden, brought down by guns at night in the Thames estuary in mid-July, its naval pilot (Oberleutnant-zur-See Hildebrant) and the two other crew members being killed. On 16 September a Heinkel He 115C of 3./KüFlGr 506 from Stavanger suffered total engine failure off the British coast near Berwick, the pilot (Haputmann Hans Kriependorf) putting the aircraft down on the sea. Despite capsizing, the aircraft was towed into Eyemouth harbour and later repaired for use by the RAF; in this aircraft were the two most senior officers of 3./KüFlGr 506. The following night 1./KüFlGr 106 also lost its *Staffelkapitän*, as did 3./KüFlGr 106 two nights later. Küstenfliegergruppe 506's *Gruppenkommandeur*, Major Wilhelm Rentsch, was killed in an accident involving a 1./KüFlGr 506 He 115 on 25 September. One unexplained accident occurred during the Battle of Britain period when two aircraft of 3./KüFlGr 506 crashed on Jan Meyen island almost 480 km (300 miles) north of Iceland, both crews being rescued unhurt.

The loss of 33 aircraft during the summer of 1940 was certainly heavy, having regard to the number of aircraft in service, 3./KüFlGr 506 losing seven aircraft, and 3./KüFlGr 106 and 1./KüflGr 506 six each. The majority of *Staffel* pilots and some navigators were officers of the Kriegsmarine, but as casualties mounted their places were often taken by Luftwaffe aircrew. At least one such Luftwaffe He 115 pilot, Oberleutnant Karl Barth, was awarded the Knight's Cross for his combat record during the Battle of Britain. Such was the importance attached to sea mining by the Germans that the task also came to be undertaken by Luftwaffe bomber units, particularly when mines were to be sown inside British harbours.

This He 115 displays the ladder stretching from the rear of the float to the rear cockpit. This was necessary because the fuselage was at least man-high from the surface, with the cockpit over 3 m (9.8 ft) above the water.

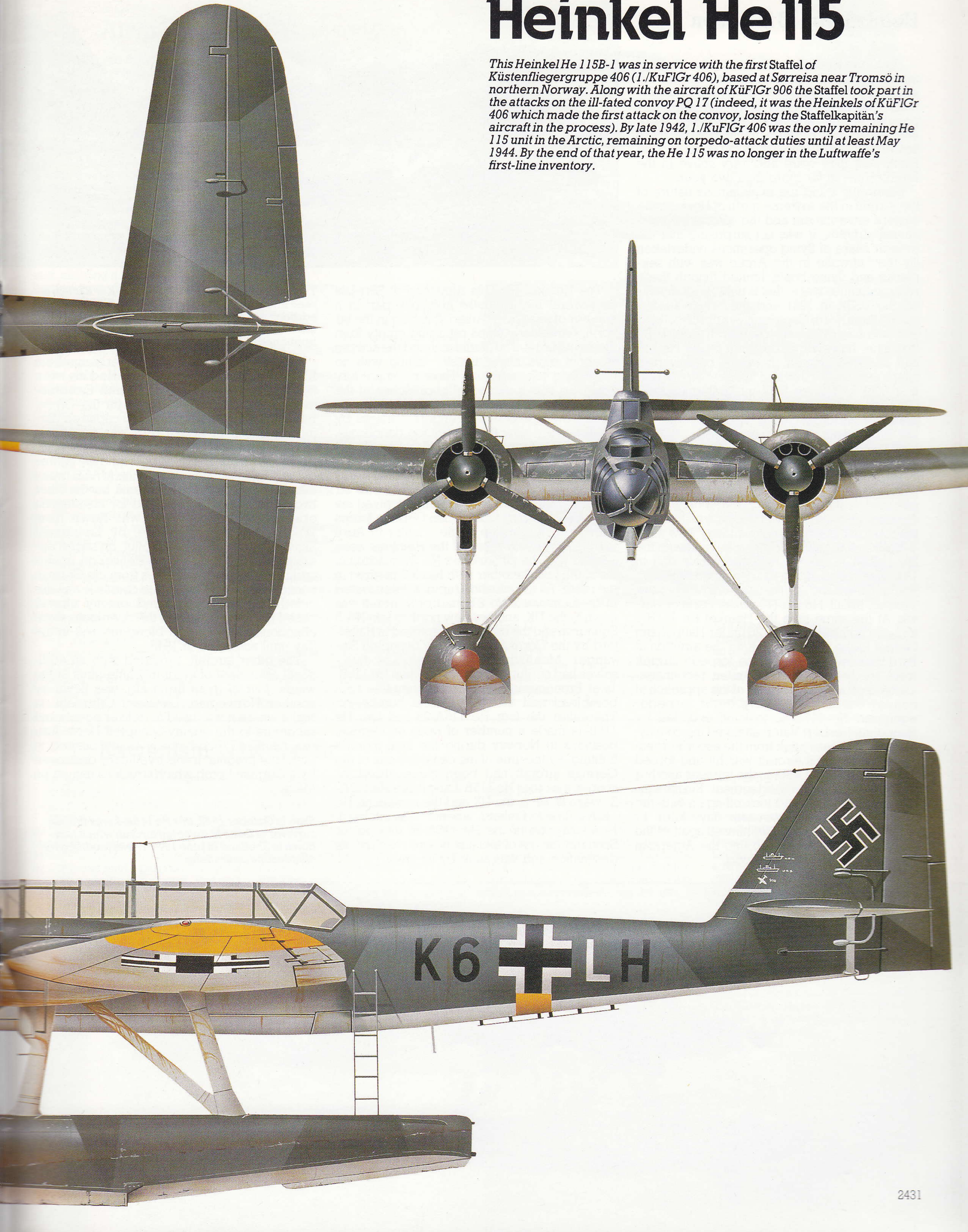






Heinkel He 115

This Heinkel He 115B-1 was in service with the first Staffel of Küstenfliegergruppe 406 (1./KuFlGr 406), based at Sørreisa near Tromsö in northern Norway. Along with the aircraft of KüFlGr 906 the Staffel took part in the attacks on the ill-fated convoy PQ 17 (indeed, it was the Heinkels of KüFlGr 406 which made the first attack on the convoy, losing the Staffelkapitän's aircraft in the process). By late 1942, 1./KuFlGr 406 was the only remaining He 115 unit in the Arctic, remaining on torpedo-attack duties until at least May 1944. By the end of that year, the He 115 was no longer in the Luftwaffe's first-line inventory.



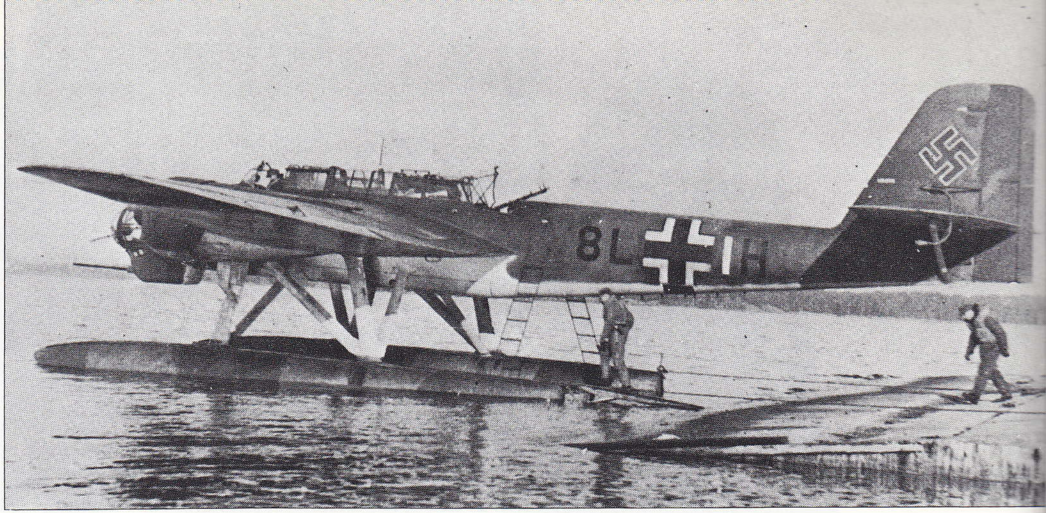
Heinkel He 115 in Action

For all the weaknesses inherent in early German sea mine design, production of the magnetic mine reached enormous proportions. The Heinkel He 115 was an extremely popular aircraft among its crews who were later called on to perform mining operations off Soviet ports in the far north, in the Baltic and the Black Sea; they were also very active in the Mediterranean for more than two years.

Bearing in mind the mountainous nature of the terrain in the extreme north of Norway, the austere environment and the sparsity of operational airfields, it was not surprising that the greater share of flying operations undertaken by the Luftwaffe in the Arctic was with seaplanes and flying-boats, limited though these responsibilities were; that is until Hitler attacked the USSR in 1941 and the British started sailing their North Cape convoys from Scotland and Iceland to Murmansk and Archangelsk. By that time, however, production of the He 115 had been terminated (it was to be restarted later), and KüFlGr 106 and 506 (as KGr 106 and KGr 506) had been fully integrated into the Luftwaffe with Junkers Ju 88 bombers; KüFlGr 906 had re-equipped with Blohm und Voss Bv 138 flying-boats.

Little action

For many months the British convoys sailed with little interference, enemy air action being confined to shadowing by Focke-Wulf Fw 200 Condors and the flying-boats, as well as sporadic U-boat attacks. Meanwhile a new unit, 1./KüFlGr 406, had undergone training with the He 115C-4 in the torpedo attack role and in 1942 was based under the command of Hauptmann Eberhard Peukert at Sørreisa, near Tromsö, about 115 km (70 miles) north of Narvik. At the same time the Heinkel He 111H-6 torpedo bombers of I/KG 26 under Hauptmann Gernot Eicke were located on the airfields at Bardufoss and Banak. These torpedo aircraft were ready for combat when air reconnaissance reports were received of the approach of convoy PQ 17. On 2 July eight torpedo-equipped He 115C-4s took off and, led by Hauptman Herbert Vater, attacked the convoy, despite very heavy flak from the escorting vessels. The leader's aircraft was hit and forced down but before it sank in the icy seas another He 115, flown by Oberleutnant Burmester, alighted alongside and took off again with the stricken crew. At dawn two days later 1./KüFlGr 406's *Staffelkapitän* himself spotted the convoy and put a torpedo into the American freighter *Christopher Newport*.



This late-production He 115C-1 of 1./KuFlGr 906 is seen in Norway in the spring of 1942. Note the addition of a fixed 15-mm MG 151 cannon to the underside of the port fuselage, later to be upgunned to 20-mm.

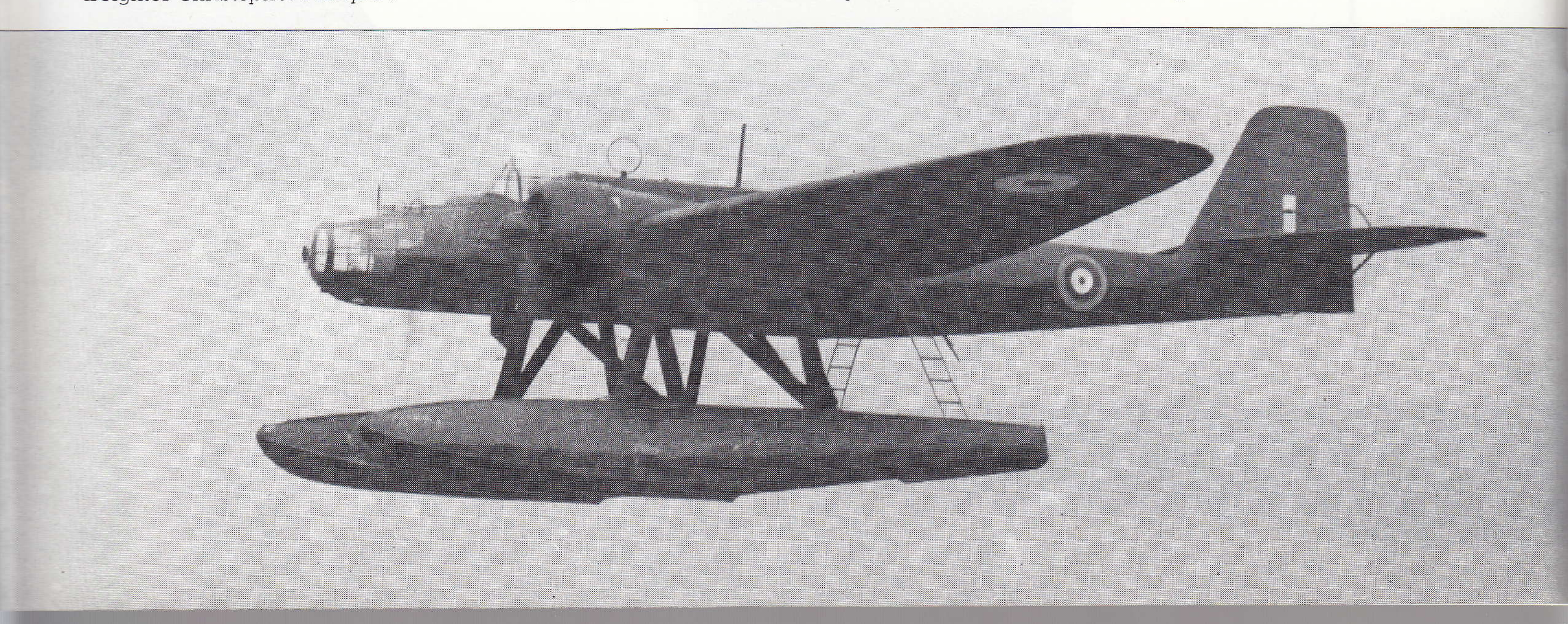
The Heinkel He 115s remained at Sörreisa for several more months and took part in a number of attacks on Allied shipping in the far north, particularly ships returning empty from the Soviet ports. The *Staffel* claimed the sinking of about eight ships, usually sailing with no more than token escort. Their principal job, however, was to mine the approaches of the ports; the appearance of escort carriers with the North Cape convoys rendered attacks by the relatively slow floatplanes too dangerous, the main attacks now being undertaken by He 111s, Ju 88s and Ju 87s.

One of the pre-war purchasers of the He 115 from Germany was Norway, whose naval air service (Marinens Flyvevaesen) received six He 115A-2s during 1939. When German forces opened their invasion of the country in April the following year three of the Heinkels were serving with the air service's No. 2 Squadron in the south and the other with No. 3 Squadron in the north. As the situation rapidly deteriorated in the south one of No. 2 Squadron's aircraft was flown to the UK, another flew north to join No. 3 Squadron and the other was captured in Hafrsfjord by the Germans when they occupied Stavanger. Meanwhile the Norwegians themselves had captured a pair of German He 115B-1s at Brønnøysund and Ørnes complete with bombload and the new Goertz bombsight. Thereafter the four He 115A-2s and two He 115B-1s made a number of raids on German positions in Norway during the final month's fighting. By the time of the ceasefire one of the German aircraft had been cannibalized for spares, the other He 115B-1 and three He 115A-2s were flown to the UK and the remaining He 115A-2 flew to Finland, where it was interned. However, one of the He 115A-2s making for Scotland ran out of fuel just before reaching its destination and was sunk by its crew.

Given RAF markings and the serial numbers BV184-BV187, the four surviving He 115s were taken over by the Marine Aircraft Establishment (MAEE) at Helensburgh on the Clyde, being joined by another He 115 captured during the Battle of Britain (this was eventually cannibalized and is believed not to have carried a British serial number). During the course of fairly exhaustive trials with the MAEE two of the aircraft were lost in accidents, but the other two were specially prepared for clandestine operations. One aircraft was flown from Woodhaven, near Dundee, by Lieutenant Skavhaugen, a Norwegian pilot, on secret operations to his native land, delivering agents and returning with escapees from the German occupation. However, in due course it was decided that using a captured 'enemy' aircraft posed too many risks and the operations were abandoned, the aircraft bieng moored in the Tay until scrapped in 1943.

The other aircraft, provided with an additional armament of eight machine-guns in the wings (four of them firing aft), was flown by another Norwegian, Lieutnant Offerdahl, to Malta where it was used to deliver agents and saboteurs to the enemy-occupied North African mainland, occasionally being painted in Luftwaffe insignia. It was eventually destroyed by a German bomb which struck its hangar on Malta.

Seen in October 1942, this He 115A-2 was the last survivor of three Norwegian aircraft which had flown to Shetland in June 1940. It was modified for clandestine operations.



JAPAN

Aichi E13A

Numerically the most important of all Japanese float seaplanes during World War II, the **Aichi E13A** monoplane (of which 1,418 were produced) originated in a naval staff specification issued to Aichi, Kawanishi and Nakajima in 1937 for a three-seat reconnaissance seaplane to replace the six-year-old Kawanishi E7K2 float biplane. A prototype was completed late in 1938 and after competitive trials with the Kawanishi E13K in December 1940 was ordered into production as the **Navy Type 0 Reconnaissance Seaplane Model 1**. Early aircraft were embarked in Japanese cruisers and seaplane tenders the following year and, carrying a single 250-kg (551-lb) bomb apiece, flew a series of raids on the Hankow-Canton railway. Soon afterwards **E13A1** floatplanes accompanied the Japanese 8th Cruiser Division for reconnaissance patrols during the strike against Pearl Harbor in December 1941.

Thereafter, as production switched to Kyushu Hikoki KK at Zasshonokuma and accelerated, the seaplanes (codenamed **'Jake'** by the Allies) were embarked in the battleships and cruisers of the *Kantais* (fleets), including the battleship *Haruna* and cruisers *Chikuma* and *Tone* of Vice Admiral Nagumo's Carrier Striking Force at the Battle of Midway. Because of mechanical problems with the ships' catapults there were delays in launching one of the four E13A1s to search for the American carriers at dawn on the crucial 4 June 1942, depriving the Japanese of the vital initiative during the early stages of the assault on Midway. Furthermore the *Chikuma*'s E13A1 was forced to return early when it suffered engine trouble, further reducing the all-important search area. One of the other 'Jake' pilots, from the cruiser *Tone*, eventually sighted the American fleet but at first failed to report the presence of carriers, causing a further 30-minute delay in arming the strike aircraft awaiting orders to launch from Japanese carriers. As it was, when the Americans launched their first strike, the pilots found the decks of the carriers *Akakgi, Kaga, Soryu* and *Hiryu* clogged with aircraft which should have been attacking the American fleet.

In all, it is estimated that by mid-1943 more than 250 E13A1s were at sea aboard Japanese ships, though their use was severely curtailed whenever American fighters were in evidence. Nevertheless they continued to serve right up to the end of the war, many of them being ultimately used in suicide attacks on the huge American invasion fleets closing on the Japanese homeland.

Specification

Aichi E13A1a

Type: three-seat reconnaissance floatplane

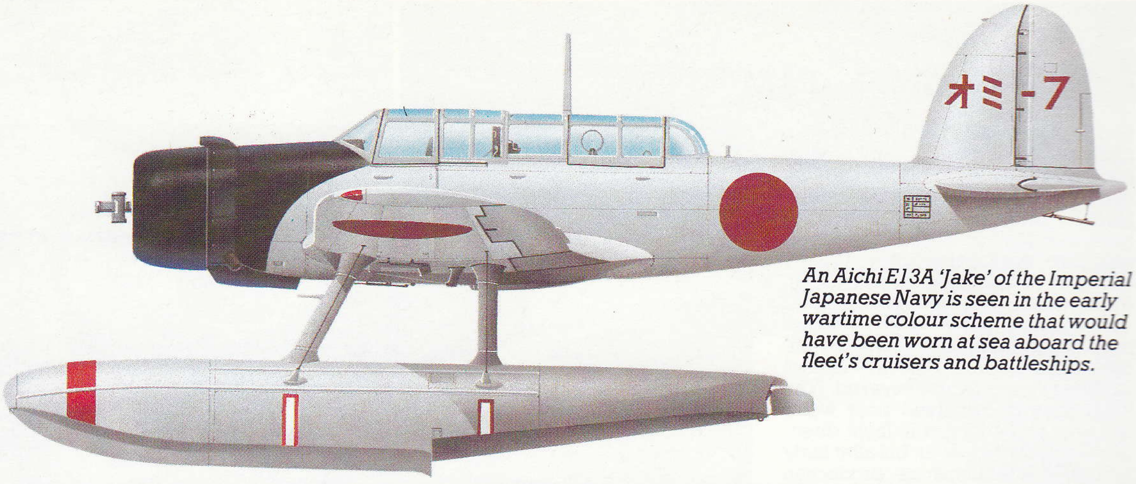
Powerplant: one 790-kW (1,060-hp) Mitsubishi Kinsei 43 radial piston engine

Performance: maximum speed 377 km/h (234 mph) at 2180 m (7,155 ft); climb to 3000 m (9,845 ft) in 6 minutes 5 seconds; service ceiling 8730 m (28,640 ft); range 2089 km (1,298 miles)

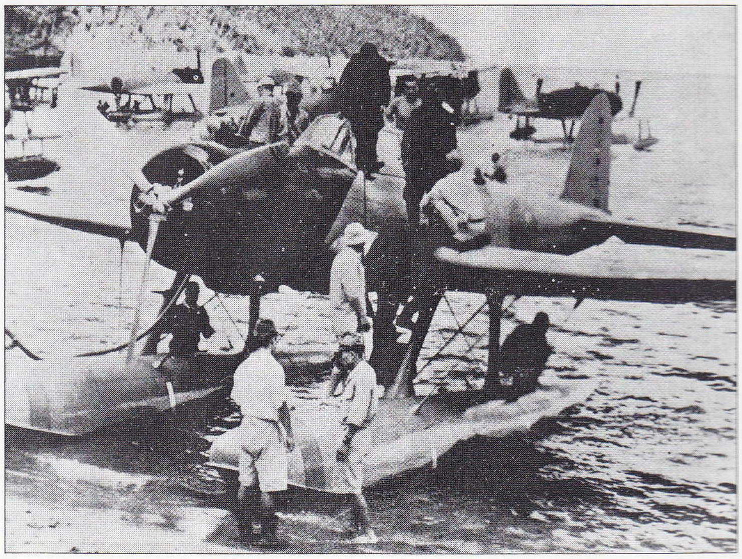
Weights: empty 2642 kg (5,825 lb); maximum take-off 4000 kg (8,818 lb)

Dimensions: span 14.50 m (47 ft 6.9 in); length 11.30 m (37 ft 0.9 in); height 7.40 m (24 ft 3.3 in); wing area 36.0 m^2 (387.5 sq ft)

Armament: one 7.7-mm (0.303-in) trainable machine-gun in the rear cockpit, plus 250 kg (551 lb) of bombs and/or depth charges



An Aichi E13A 'Jake' of the Imperial Japanese Navy is seen in the early wartime colour scheme that would have been worn at sea aboard the fleet's cruisers and battleships.



At a Japanese seaplane base somewhere in the Pacific the crew of an E13A leave their cockpits. With a range of nearly 2100 km (1,300 miles), sorties could, and often did, mean up to 15 hours at a time in the cockpit for the three-man crew.

JAPAN

Kawanishi N1K Kyofu

Anticipation of a need for single-seat float-equipped interceptor seaplanes prompted the Japanese navy to initiate a development programme for such aircraft in 1940, the Nakajima A6M2-N floatplane adaptation of the famous Mitsubishi A6M2 Zero being intended as a stopgap until a purpose-designed aircraft could be introduced. This was to be the highly-imaginative and attractive **Kawanishi N1K Kyofu** (mighty wind), whose design was started in September of that year. Featuring a central float and twin wing-mounted stabilizing floats, the new prototype retained the same gun armament as the A6M2 but was powered by a 1089-kW (1,460-hp) Kasei 14 radial engine driving two-blade contraprops in an attempt to counter the torque-induced swing on take-off. The wing-mounted floats were originally intended to be retractable but design problems led to these being fixed before the aircraft's first flight. Persistent trouble with the contraprop gearbox resulted in a change to the Kasei 13 engine driving a single three-blade propeller from the second prototype onwards.

First flown on 6 May 1942, the **N1K1** went on to trials with the navy, whose pilots were enthusiastic about the performance, although expressing misgivings over the tricky take-off characteristics. In the air, with its combat flaps, the Kyofu handled beautifully and possessed excellent manoeuvrability. At a time (the end of 1942) when the Zero naval fighter had effectively won air superiority for the Japanese in the Pacific, the N1K1 was ordered into production, but the delivery rate was slow to accelerate and fortunes changed rapidly during 1943. Thus in December of that year, with only 15 aircraft being completed each month and Japanese offensive initiative dwindling, it was decided to end production of the aircraft, and in March 1944 the last of 89 Kyofus was delivered to the service.

Codenamed **'Rex'** by the Allies, the N1K1 was first deployed for the defence of Balikpapan in Borneo, whose recovery by the Allies was regarded as no longer pressing as American forces surged closer to the Japanese homeland, while the Japanese then lacked the carriers with which to protect their isolated garrisons. In the final weeks of the war N1K1s flew alongside the 'Rufes' of the Otsu Kokutai from Lake Biwa in defence of central Honshu against the increasing American raids on Japan. It was ironic that so promising was the N1K1 that the Japanese had reversed the process of adaptation, and with it produced the N1K2-J 'George' landplane fighter, certainly one of the best Japanese aircraft to see combat during the war.

Specification

Kawanishi N1K1

Type: single-seat interceptor fighter floatplane

Powerplant: one 1089-kW (1,460-hp) Mitsubishi MK4C Kasei 13 radial piston engine

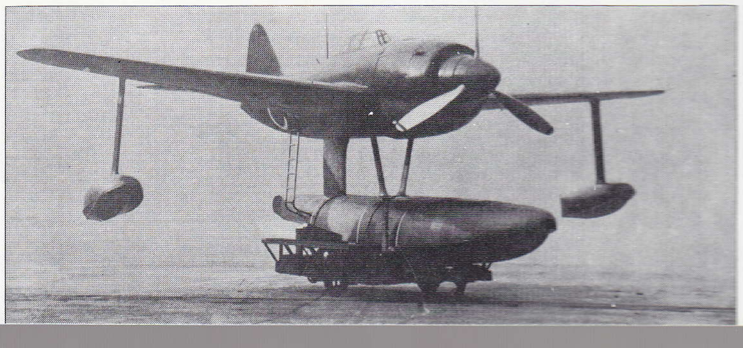
Performance: maximum speed 489 km/h (304 mph) at 5700 m (18,700 ft); climb to 5000 m (16,405 ft) in 5 minutes 30 seconds; service ceiling 10600 m (34,775 ft); range 1050 km (652 miles)

Weights: empty 2752 kg (6,067 lb); maximum take-off 3712 kg (8,184 lb)

Dimensions: span 12.00 m (39 ft 4.4 in); length 10.59 m (34 ft 8.9 in); height 4.75 m (15 ft 7 in); wing area 23.5 m^2 (252.96 sq ft)

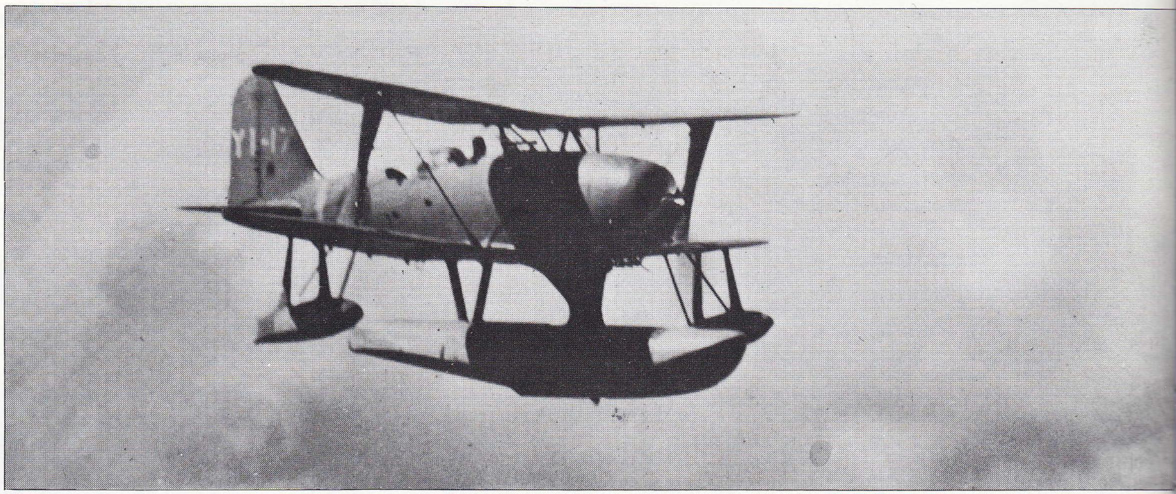
Armament: two fixed forward-firing 20-mm cannon and two fixed forward-firing 7.7-mm (0.303-in) machine-guns, plus two 30-kg (66-lb) bombs under the wings

Designed as a fighter to support offensive operations far from land-based air cover, the Kyofu was a fine machine overtaken by events in the Pacific which saw its planned role made superfluous.



JAPAN

Mitsubishi F1M



Unlike the reconnaissance types carried by major Japanese surface units, the Mitsubishi F1M 'Pete' was an observation aircraft, designed for such tasks as gunfire direction, but was rarely used for that purpose.

Roughly equivalent to the American Curtiss SOC Seagull observation float biplane, the smaller **Mitsubishi F1M** was of more compact and neater design, its development starting about two years later in 1934. First flown in June 1936, the **F1M1** embodied all the efforts of its designers to achieve an exceptionally clean aerodynamic shape, including low-drag float mountings, single interplane struts and all-metal construction, only the control surfaces being fabric-covered. The early aircraft displayed poor water handling and a lack of in-flight directional stability, however, but after fairly extensive alterations the production **F1M2** emerged as a thoroughly efficient aircraft, acceptable in all respects.

Initial production by Mitsubishi, which got under way in 1938, amounted to 524 aircraft before it was transferred to the 21st Naval Air Arsenal (Dai-Nijuichi Kaigun Kokusho) at Sasebo, where a further 590 were built. In due course the F1M2 equipped all but one of the K-Maru (6,900-ton) and S-Maru (7,200/8,300-ton) classes of converted merchant seaplane tenders, as well as numerous battleships and cruisers of the Imperial Japanese Navy. Codenamed **'Pete'** by the Allies, F1M2s were present at the Battle of Midway, two aircraft being launched from the battleship *Kirishima* (but being lost when the Japanese scuttled the sorely-crippled ship at the end of the Battle of the Solomons). The giant superbattleships *Musashi* and *Yamato* each carried several 'Petes' to spot for their 460-mm (18.1-in) main gun armament at the time of the Marianas battles, but none was used in earnest; instead the *Musashi* succumbed to American bombs and torpedoes in the Sibuyan Sea; the *Yamato*, bent on a suicide mission to Okinawa, followed her to the bottom on 7 April 1945.

Nevertheless 'Pete' seaplanes were widely used throughout the Pacific war, accompanying every seaborne landing by Japanese forces, providing gunnery spotting during preliminary bombardment by supporting warships and subsequently serving as covering fighters (and even dive-bombers) once the assault forces were ashore. It was also flown on convoy escort duties with the many supply convoys sailed by the Japanese during the mid-war period. In the last stages of the war, the type was committed to the unequal task of defending the Japanese homeland from the devastating American raids, serving alongside 'Rex' and 'Rufe' seaplane fighters with the Otsu Kokutai in 1945.

Specification

Mitsubishi F1M2

Type: two-seat observation floatplane

Powerplant: one 611-kW (820-hp) Mitsubishi Hikari 1 radial piston engine

Performance: maximum speed 370 km/h (230 mph) at 3440 m (11,285 ft); climb to 5000 m (16,405 ft) in 9 minutes 36 seconds; service ceiling 9440 m (30,970 ft); range 740 km (460 miles)

Weights: empty 1928 kg (4,251 lb); maximum take-off 2550 kg (5,622 lb)

Dimensions: span 11.00 m (36 ft 1.1 in); length 9.50 m (31 ft 2 in); height 4.00 m (13 ft 1.5 in); wing area 29.54 m^2 (317.97 sq ft)

Armament: two fixed forward-firing 7.7-mm (0.303-in) machine-guns and one 7.7-mm (0.303-in) trainable machine-gun in the rear cockpit, plus two 60-kg (132-lb) bombs under the wings

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JAPAN

Nakajima A6M2-N

Japan was the only nation to produce and deliver into service float-equipped single-seat interceptor fighter seaplanes (the British Spitfire float adaptation did not progress beyond the experimental stage). When in 1940 the Japanese navy initiated the design of a new interceptor seaplane (the Kawanishi N1K1 Kyofu, or 'Rex'), the need was also expressed for a stopgap aircraft and the Nakajima company was instructed in February 1941 to develop a float-equipped version of the excellent Mitsubishi A6M2 Zero naval interceptor. As evidence of Japan's long-standing plans for territorial expansion through the Pacific, it had been recognized that in the inevitable 'island-hopping' war there would be few ready-made air bases from which to provide air cover during the occupation of the smaller islands, and that the construction of runways would be impractical. Although equipped with almost a dozen aircraft-carriers, the Japanese would be unable to use them in support of every single island invasion.

After removing the wheel landing gear and fairing over the wheel wells of a standard A6M2, Nakajima mounted a large float under the fuselage by means of a forward-raked central pylon and a pair of V-struts below the cockpit; two cantilever stabilizing floats were also mounted under the wings. The standard Zero gun armament was retained, and the first prototype was flown on 7 December 1941, the day on which the Japanese navy attacked Pearl Harbor.

Entering production as the **Nakajima A6M2-N** and codenamed **'Rufe'** by the Allies, the new fighter still displayed a creditable performance, being first issued to the Yokohama Kokutai and deployed to Tulagi in the Solomons where the Japanese had first landed during the Battle of the Coral Sea. However, almost all the 'Rufes' were destroyed in a strike on the seaplane base by 15 Grumman F4Fs from USS *Wasp* on 7 August 1942. Better success attended the 'Rufes' which fought in the later Aleutian campaign, but losses soared as soon as American fighter strength could be built up. During the final year of the war, when American heavy bombers and naval aircraft opened their great attacks on the Japanese homeland, 'Rufes' of the Otsu Kokutai, based on Lake Biwa, were thrown into the battle as interceptors in defence of Central Honshu but suffered very heavy losses. Total production of 'Rufe' amounted to 327 before being halted in September 1943.

Specification

Nakajima A6M2-N

Type: single-seat interceptor fighter floatplane

Powerplant: one 708-kW (950-hp) Nakajima NK1C Sakae 12 radial piston engine

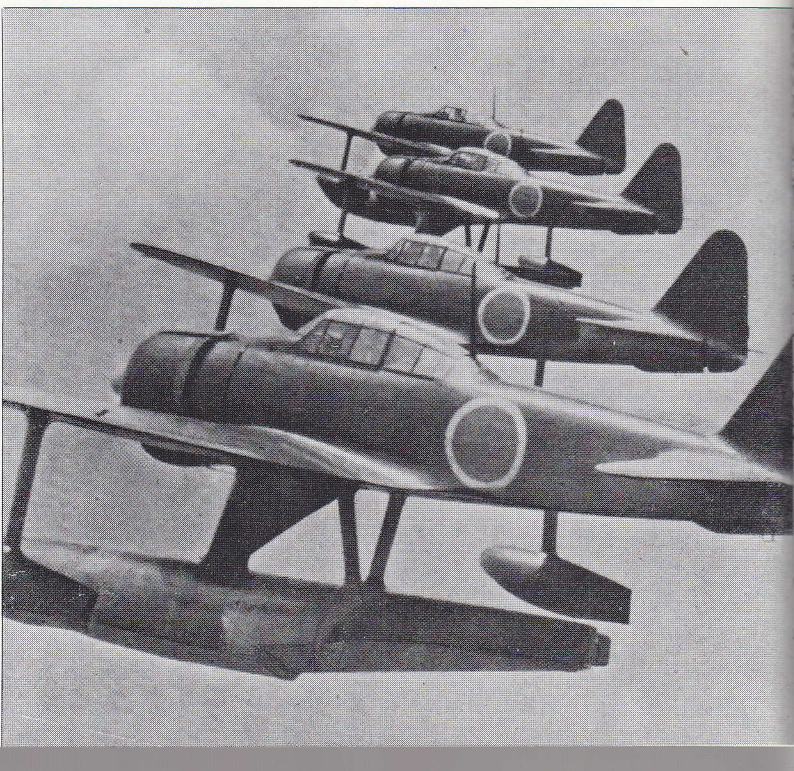
Performance: maximum speed 435 km/h (270 mph) at 5000 m (16,405 ft); climb to 3000 m (9,845 ft) in 3 minute 54 seconds; service ceiling 10000 m (32,810 ft); range 1781 km (1,107 miles)

Weights: empty 1912 kg (4,215 lb); maximum take-off 2880 kg (6,349 lb)

Dimensions: span 12.00 m (39 ft 4.6 in); length 10.10 m (33 ft 1.6 in); height 4.30 m (14 ft 1.3 in); wing area 22.44 m^2 (241.54 sq ft)

Armament: two fixed forward-firing 20-mm cannon and two fixed forward-firing 7.7-mm (0.303-in) machine-guns, plus provision for two 60-kg (132-lb) bombs under the wings

Until the purpose-designed N1K could be produced, the Japanese navy acquired a stopgap floatplane fighter in the Nakajima adaptation of Mitsubishi's famed A6M 'Zero'.



Pacific Seaplanes

The vast expanses of the Pacific and the distance from supporting land-based aviation meant that all major vessels had to have some kind of aerial reconnaissance capacity. In addition, the plan for Japanese expansion foresaw an empire among the islands, hence the large-scale introduction of the floatplane in the years before 1941.

A Vought OS2U Kingfisher taxis onto the recovery sled of the heavy cruiser USS Quincey. *This technique allowed the recovery of spotter seaplanes while under way, an important consideration in a combat zone.*

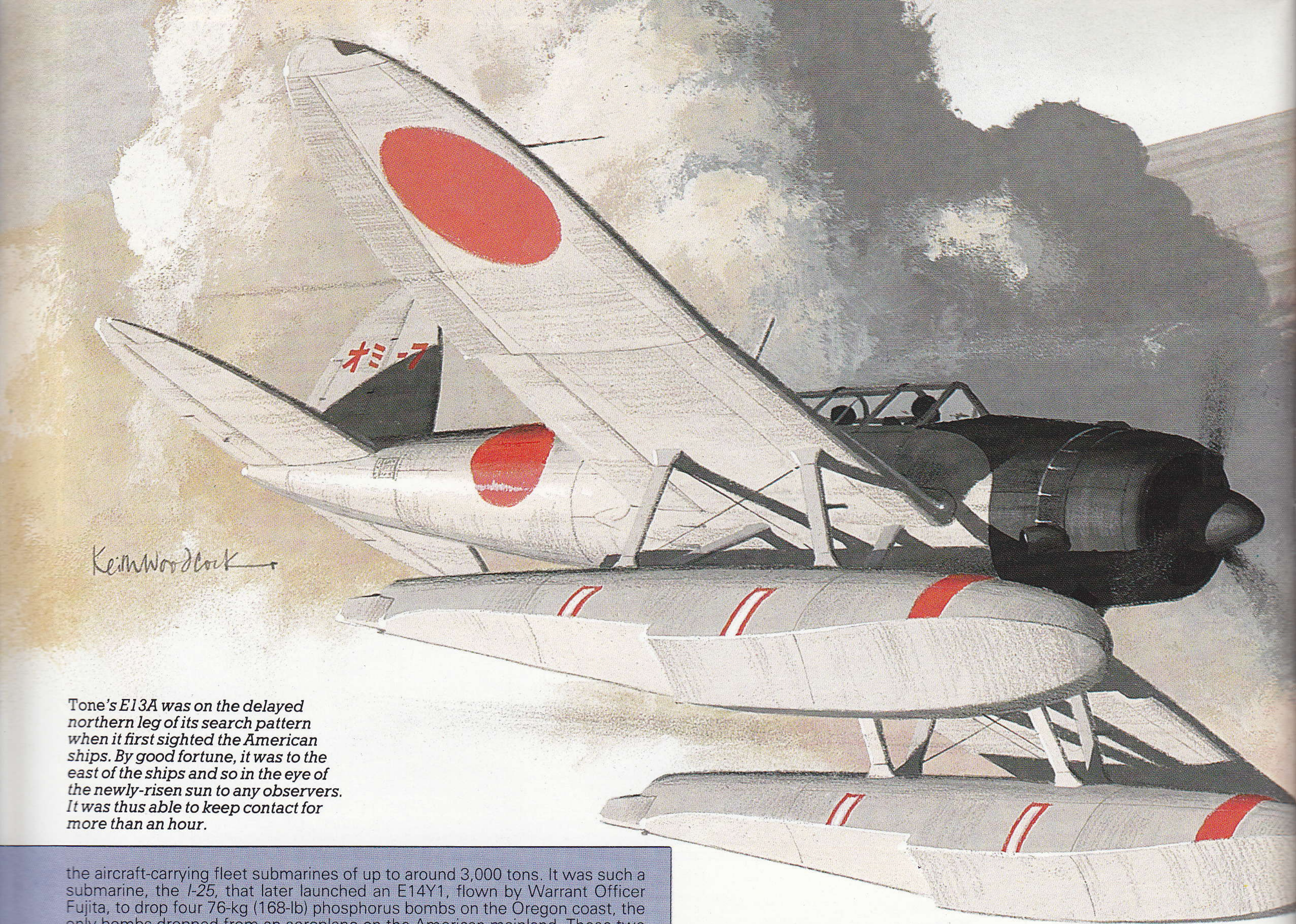
In preparing for the war in the Pacific for which, like all aggressor nations, she could 'call the tune' with regard to military equipment, Japan envisaged widespread use of float-equipped seaplanes to support her numerous territorial ambitions; such aircraft were deemed essential in view of prolonged fleet campaigns and the general scarcity of land air bases available throughout the great expanse of ocean. Accordingly considerable use was made not only of conventional aircraft-carriers but of seaplane tenders, vessels that in other navies were employed as mobile but non-operational depot ships; by contrast Japan possessed a total of about eight such tenders, with a total complement of around 100 seaplanes, which could accompany assault task forces during the first two years of the war.

Having said this, however, the seaplanes themselves were at the time of Pearl Harbor generally of obsolescent design and were not intended to engage in air combat, it being left to the excellent carrierborne fighters and bombers to secure air supremacy. Nevertheless great reliance was placed on such aircraft as the Kawanishi E7K2 'Alf' twin-float biplanes in the early months of the war, serving aboard the tenders *Chitose* and *Chiyoda*, the former being present at the Solomons campaign. Both these 11,190-ton ships were subsequently converted into escort carriers in 1943, and both were sunk by American aircraft in 1944.

The E7K2 was obsolescent when the Pacific war started, but already a much better float monoplane, the Aichi E13A1, was entering service, and this 'Jake' aircraft, operating from tenders and cruisers, had flown bombing attacks on the Canton-Hankow railway shortly before being launched from the cruisers *Chikuma*, *Kinugasa* and *Tone* during the operations against Pearl Harbor. This relatively small three-crew floatplane could, if required, remain aloft for as long as 15 hours. An even better Aichi seaplane was the E16A1 'Paul', but this entered service at a time when the initiative had already passed to the Americans, and so suffered heavy losses in the Philippines during 1944; like so many Japanese aircraft, whose intended purpose had been defeated by overwhelming Allied air superiority, many of the surviving E16A1s were simply thrown away in the desperate suicide attacks of the war's last year.

Perhaps the most imaginative service rendered by Japanese floatplanes was that in conjunction with submarines of the Imperial Navy. The concept of accommodating aircraft in submarines was by no means the sole prerogative of the Japanese, although the Japanese were alone in employing such aircraft operationally, relatively successfully and over a prolonged period. No fewer than 36 such aircraft-carrying submarines served or were built by Japan during the war. Indeed the 1935-vintage fleet submarine *I-7* (2,525 tons) launched a Yokosuka E14Y1 seaplane to carry out a damage-assessment reconnaissance of Pearl Harbor just 10 days after the crippling attack that brought the USA into the war. Some 125 of these small floatplanes were produced, and they equipped all

The myriad of islands in the East Indies made the seaplane an indispensable tool of the Japanese conquerors. After the end of the war, the Seletar naval base on Singapore island was found to be an important seaplane base, with Aichi E13s and Mitsubishi F1Ms being present in some numbers.



Tone's E13A was on the delayed northern leg of its search pattern when it first sighted the American ships. By good fortune, it was to the east of the ships and so in the eye of the newly-risen sun to any observers. It was thus able to keep contact for more than an hour.

the aircraft-carrying fleet submarines of up to around 3,000 tons. It was such a submarine, the *I-25*, that later launched an E14Y1, flown by Warrant Officer Fujita, to drop four 76-kg (168-lb) phosphorus bombs on the Oregon coast, the only bombs dropped from an aeroplane on the American mainland. These two isolated attacks were, like Doolittle's attack on the Japanese mainland in 1942 (though on a far smaller scale) intended for no more than propaganda purposes.

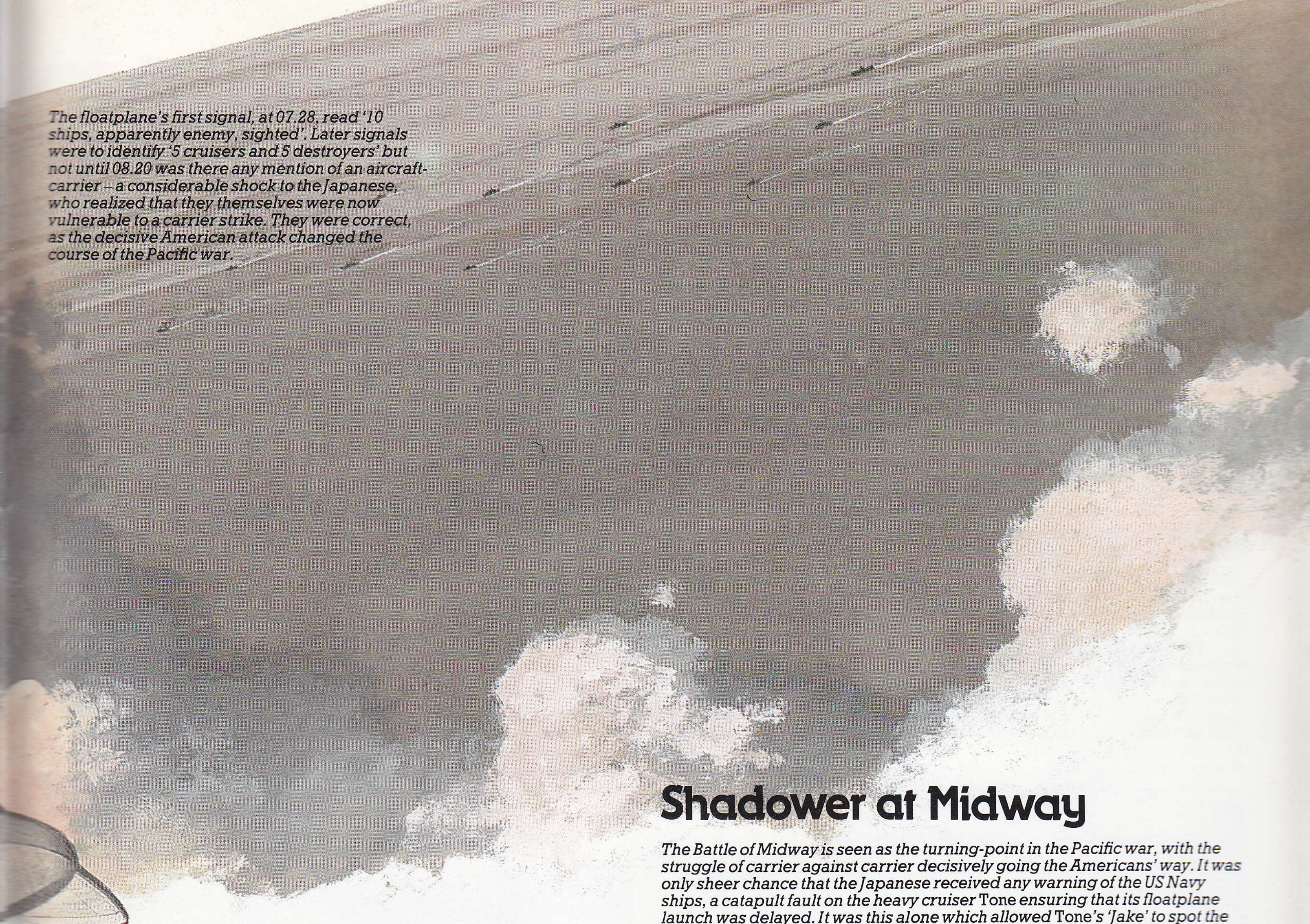
For more than two years the Japanese long-range 'I-7' class, 'I-9' class, 'I-15' class and 'I-40' class submarines roamed the Pacific and Indian Oceans, their two-man E14Y1 seaplanes being employed almost exclusively to reconnoitre Allied ports in Australia, New Zealand and the Aleutians, as well as in Ceylon, the Seychelles, Madagascar and the east coast of mainland Africa. Nine of these 22 submarines were lost during the period, usually when engaged in commerce raiding, and as Allied strength in the air grew rapidly the whole use of submarine-borne aircraft imposed unacceptable risks and severely restricted the mobility of the submarines themselves.

A far more ambitious use of submarine-borne seaplanes was conceived in 1942 when the Japanese navy initiated the design of a fast and powerful attack bomber, the Aichi M6A1, capable of delivering an 850-kg (1,874-lb) bomb over a range of 1130 km (700 miles). Intended as a 'one-way' attack aircraft (the twin floats were to be jettisoned after take-off) the M6A1 was powered by a 1,400-hp (1044-kW) Atsuta 32 inline engine. Unfortunately for the Japanese, development of the aircraft was slow, and it was 1944 before the huge 'I-400' class (5,220-ton) and smaller 'I-13' class (3,600-ton) submarines were commissioned. In 1945 plans were afoot for the Japanese 1st Submarine Flotilla to attack the locks on the vital Panama Canal, the *I-400* and *I-401* each carrying three M6A1s and the *I-13* and *I-14* two apiece. Realizing that the most worthwhile targets were already massed in the Pacific, however, the Japanese switched the flotilla against the huge US Navy anchorage at Ulithia atoll, 480 km (300 miles) south west of the Marianas. The flotilla was at sea when the atomic bombs on Hiroshima and Nagasaki brought the war to an end.

Float seaplanes were also carried by the two aircraft-carrying battleships *Hyuga* and *Ise*, each capable of accommodating 22 Aichi E16A1s. These very powerful warships were regarded by the Americans as representing a significant threat during the last year of the war, and their destruction was the US 3rd Fleet's main priority during the months preceding the assault on Iwo Jima. The big ships managed to avoid sea action, and were eventually destroyed in American naval air attacks on the port of Kure at the end of July 1945.

Although it can be seen that no single Japanese naval action was influenced by the use of seaplanes in the Pacific war, the provision of such aircraft and their widespread deployment represented an ingenious element of naval power in a massive strategic plan of aggression that was intended to occupy no more than two years. Their use also served to emphasize the relative absence of shipborne radar in the Japanese navy during those two years.

Mainstay of the scouting squadrons of the Imperial Japanese Navy, the Aichi E13A was shipped aboard heavy cruisers and seaplane carriers.

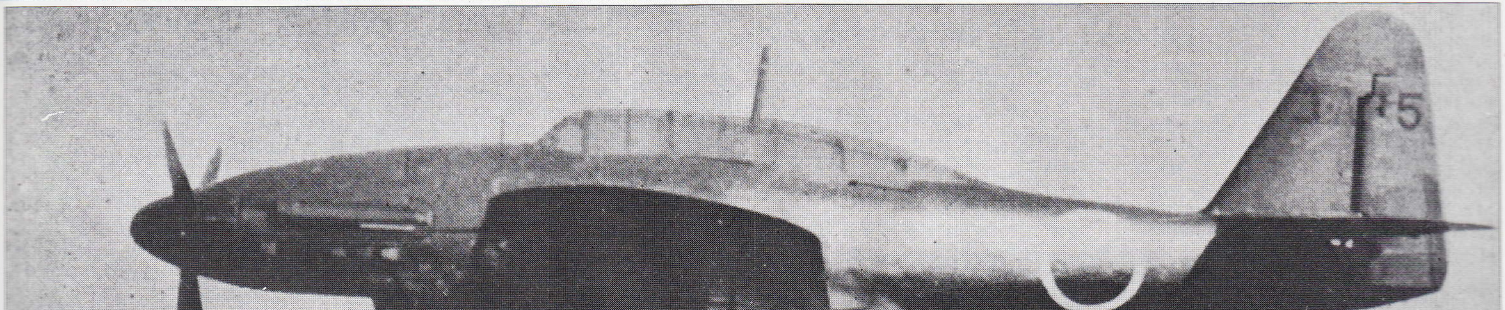


The floatplane's first signal, at 07.28, read '10 ships, apparently enemy, sighted'. Later signals were to identify '5 cruisers and 5 destroyers' but not until 08.20 was there any mention of an aircraft-carrier – a considerable shock to the Japanese, who realized that they themselves were now vulnerable to a carrier strike. They were correct, as the decisive American attack changed the course of the Pacific war.

Shadower at Midway

The Battle of Midway is seen as the turning-point in the Pacific war, with the struggle of carrier against carrier decisively going the Americans' way. It was only sheer chance that the Japanese received any warning of the US Navy ships, a catapult fault on the heavy cruiser Tone *ensuring that its floatplane launch was delayed. It was this alone which allowed* Tone's *'Jake' to spot the American force. By contrast, the Americans had partially cracked the Japanese code, and had a fairly good idea of where the Japanese were at all times.*

One of the most interesting seaplanes of the Japanese navy, the Aichi M6A Seiran was designed as a submarine-launched attack aircraft. Designed to be shipped aboard the giant 'I-400' class of submarine, the original mission of the M6A was to have been an attack on the lock gates of the Panama canal.



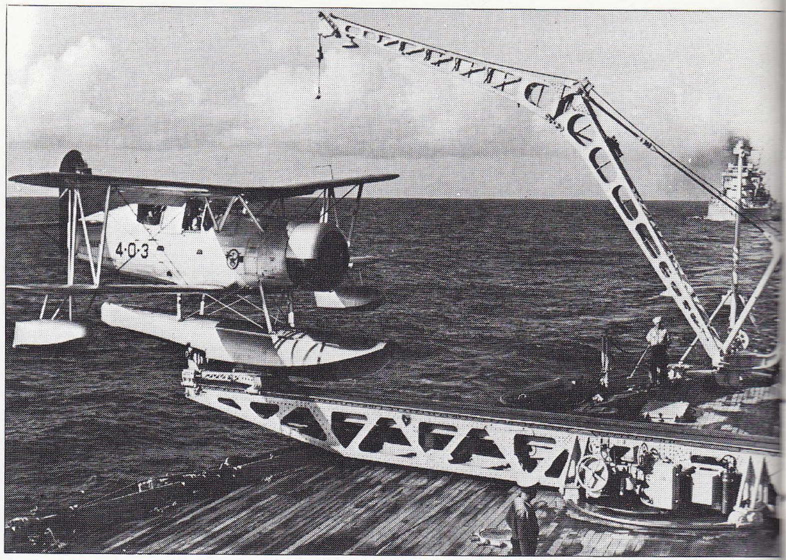
USA

Curtiss SOC Seagull

At the climax of its Service life the **Curtiss SOC Seagull** scout-observation seaplane in 1940 was serving aboard every battleship, cruiser and carrier in the US Navy, as well as a destroyer, a seaplane carrier and two gunboats, with a US Marine Corps squadron and at a US Coast Guard station. It had entered production in 1935 having beaten the Douglas XO2D-1 and Vought XO5U-1 in competition, and on 12 November that year the first operational **SOC-1** was assigned to the light cruiser USS *Marblehead*. Subsequent versions were the **SOC-2**, **SOC-3** and **SOC-4** (the **SOC-2A** and **SOC-3A** being fitted with arrester gear) and the **SON-1** produced by the Naval Aircraft Factory.

Featuring interchangeable wheel and float alighting gear (in the latter configuration it was fitted with single central float and outrigged wing floats), the SOC replaced Vought O2Us and O3Us, and was used to spot for the fleet's big guns, increasing the accuracy of the main gun armament of the US Navy's battleships. Each such battleship embarked three or four SOCs, the heavy cruisers four and the light cruisers two. Flagships usually carried an additional Seagull for use by the force commander. Production contracts, totalling 304 aircraft for the US Navy (plus three for the US Coast Guard), had been placed by the end of 1938; within two years 279 were in service, including 83 aboard the battleship divisions of the Battle Fleet and 63 with the cruiser divisions of the Scouting Force; there were also 30 SOCs with the Atlantic Squadron and 15 with Carrier Divisions One and Two in the Pacific.

During the Japanese attack on Pearl Harbor nine embarked SOCs and 13 ashore were listed as destroyed, and although no SOC was directly involved in the great Battle of Midway about 20 Seagulls undertook scouting sorties before the Solomon campaign, flying with Task Force 61. They were still extremely active in 1943, particularly in the Wake, Marshalls and Gilberts campaigns. Although by 1943 most of the 150-odd aircraft still surviving in service were usually equipped with wheel landing gear aboard American escort carriers, some cruisers still continued to carry the floatplanes, and these were present at the American landings in North Africa in November that year. The Curtiss SO-3C Seamew monoplane had been introduced to replace the SOC in 1942, but this later machine proved disappointing and, although a greater number was produced, it was the old Seagull that remained in US Navy service longer, surviving up to the end of 1944.



A Curtiss SOC Seagull stands ready for launch on the catapult aboard the battleship USS* West Virginia. *In 1940 this scout-observation seaplane was shipped aboard every battleship, cruiser and carrier in the US Navy.

Specification
Curtiss SOC-1 Seagull

Type: two-seat scout and observation floatplane

Powerplant: one 447-kW (600-hp) Pratt & Whitney R-1340-18 Wasp radial piston engine

Performance: maximum speed 253 km/h (157 mph) at sea level; climb to 1525 m (5,000 ft) in 5 minutes 54 seconds; service ceiling 4540 m (14,900 ft); range 1535 km (954 miles)

Weights: empty 1591 kg (3,508 lb); maximum take-off 2466 kg (5,437 lb)

Dimensions: span 10.97 m (36 ft 0 in); length 9.65 m (31 ft 8 in); height 4.29 m (14 ft 1 in); wing area 32.33 m^2 (348 sq ft)

Armament: one fixed forward-firing 7.62-mm (0.3-in) machine-gun and one 7.62-mm (0.3-in) trainable machine-gun in the rear cockpit, plus two 45-kg (100-lb) bombs under the wings

USA

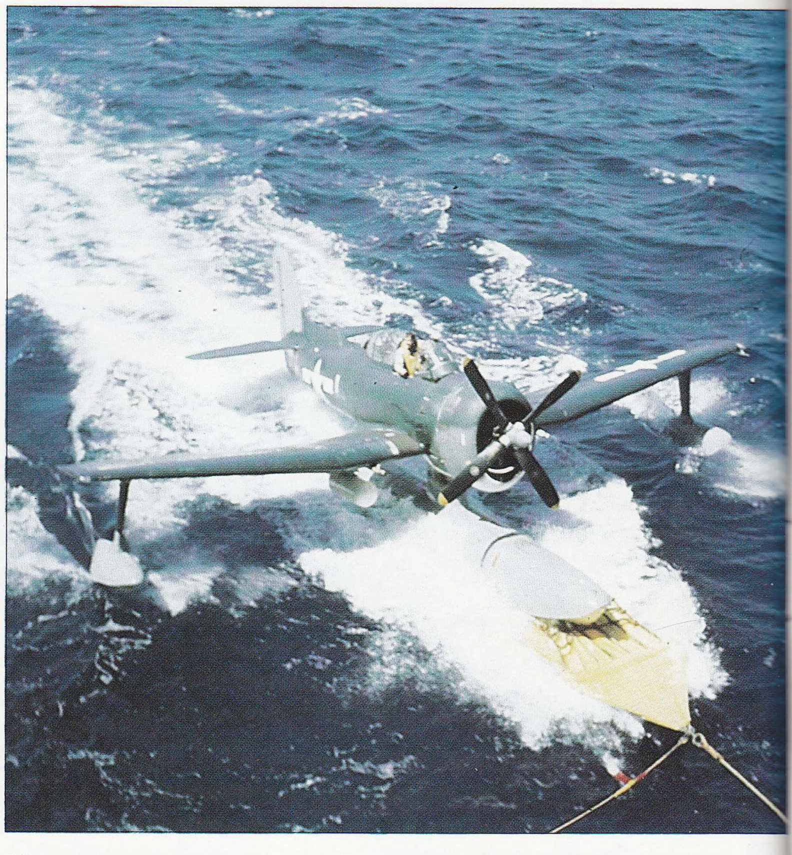
Curtiss SC-1 Seahawk

The Curtiss SC-1 Seahawk monoplane was unique among American scout seaplanes of World war II in being a relatively high performance single-seater with an almost fighter-like speed. It was almost the last of a long line of aircraft in the scout-observation category built by Curtiss to serve aboard American battleships and cruisers. Like its immediate predecessor, it featured a single large central float with stabilizing wing-tip floats, these being replaceable by fixed wheel landing gear for shore base operation.

Subject of Curtiss design proposals, the SC-1 Seahawk was accepted by US Navy letter of intent on 30 October 1942 and prototypes were ordered on 31 March 1943. The first of two **SC-1** aircraft made its first flight on 16 February 1944, by which time production orders for 500 SC-1s had been placed. Production deliveries started in the late summer that year, the aircraft being completed with wheel landing gear for delivery to shore depots; the Edo float assemblies, being purchased separately, were fitted to the aircraft according to fleet requirements; the first aircraft were shipped aboard transports to Australia late in 1944 for delivery to warships of the US 7th Fleet. The first aircraft was embarked in USS *Guam* on 22 October.

The Seahawk saw little operational service other than constant air-sea rescue patrols, this despite the provision of a somewhat cramped bunk in the rear fuselage limiting such rescues to single ditched airmen. In the relatively straightforward recovery of Borneo, however, which was regarded as something of a sideshow at the end of the war with Japan and which was opposed by only small numbers of Japanese aircraft, a few Seahawks with the 7th Fleet were used for gunnery control during the preliminary bombardment before the seaborne landings. Some aircraft were said to have been used in the 'attack' category, the Seahawk being capable of carrying a pair of 45-kg (100-lb) bombs in a bay in the central float; for anti-submarine work the aircraft would mount an ASH radar set in a pod under the starboard wing and a 113-kg (250-lb) bomb under the port wing.

Total production of the Seahawk, before VJ-Day brought cancellation of outstanding orders, was 566 aircraft; nine examples of an improved two-seat version, the **SC-2**, were delivered to the US Navy in 1946.



The Seahawk was a high-performance single-seater ordered by the US Navy in 1942, and entering service in 1944 aboard USS* Guam. *In the event it saw little combat and was mainly used for air-sea rescue patrols.

Specification
Curtiss SC-1 Seahawk

Type: single-seat shipborne scout and air-sea rescue floatplane

Powerplant: one 1007-kW (1,350-hp) Wright R-1820-62 Cyclone radial piston engine

Performance: maximum speed 504 km/h (313 mph) at 8715 m (28,600 ft); climb to 3050 m (10,000 ft) in 4 minutes 6 seconds; service ceiling 11370 m (37,300 ft); range 1016 km (625 miles)

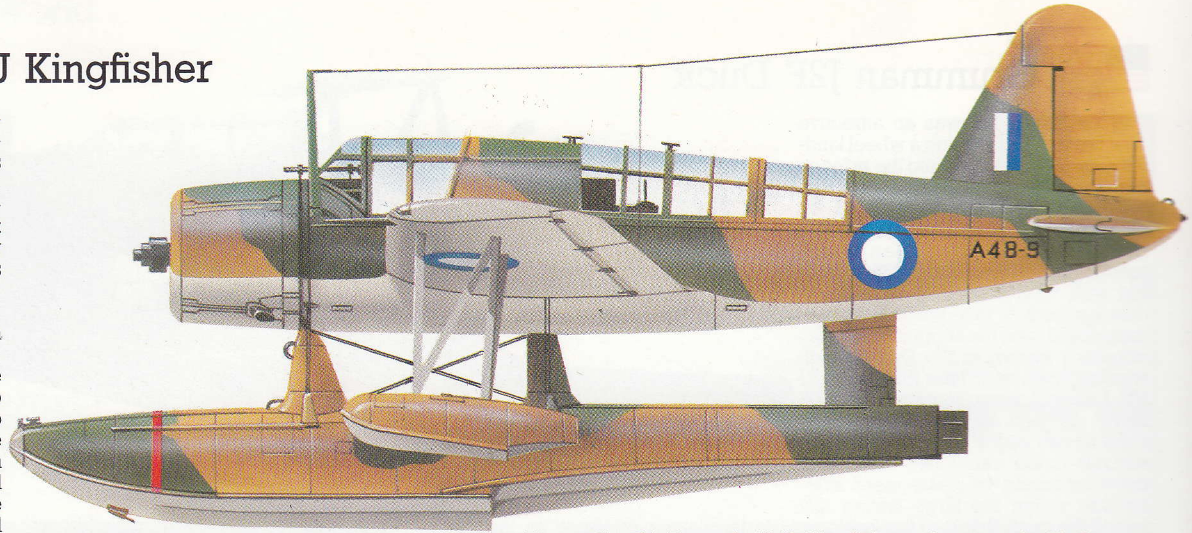
Weights: empty 2867 kg (6,320 lb); maximum take-off 4082 kg (9,000 lb)

Dimensions: span 12.50 m (41 ft 0 in); length 11.09 m (36 ft 4.5 in); height 5.49 m (18 ft 0 in); wing area 26.01 m^2 (280 sq ft)

Armament: two fixed forward-firing 12.7-mm (0.5-in) machine-guns, plus two 113- and two 45-kg (250- and 100-lb) bombs

USA

Vought OS2U Kingfisher



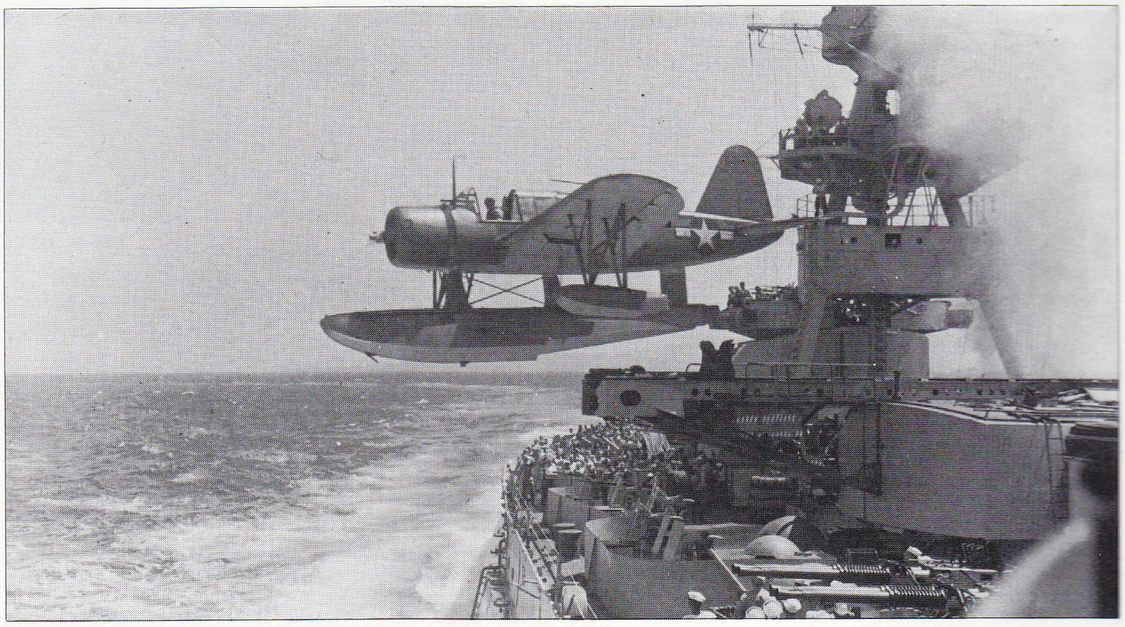
A Vought Kingfisher Mk 1 of No. 107 Squadron, Royal Australian Air Force, in 1942. Kingfishers also served with the Fleet Air Arm aboard armed merchant cruisers. In the US Navy most Kingfishers were catapulted from the fantails of battleships and cruisers.

Displaying many of the traditional features of the American naval observation and scouting biplanes of the 1930s (radial engine, deep spacious cockpit, large 'glasshouse' over the rear cockpit and central main float), the **Vought OS2U** monoplane was the first military aircraft to employ spot welding in its primary structure.

Ordered in prototype form in 1937, the first **XOS2U-1** made its maiden flight on 20 July of the following year, initial service deliveries being made in August 1940. The first aircraft to serve aboard an American battleship was embarked in USS *Colorado*. Of the 54 **OS2U-1** floatplanes completed in that year the majority was distributed between the Pearl Harbor Battle Force, Alameda NAS Battle Force and the Pensacola naval air station.

Progressively improved **OS2U-2** and **OS2U-3** aircraft were delivered up to 1942, the latter being the most widely used version with increased fuel capacity and improved armour protection for the crew; a total of 1,306 was produced (including 300 **OS2N-1** aircraft built by the Naval Aircraft Factory at Philadelphia). Apart from ships of the US Navy, the type equipped the Inshore Patrol Squadrons (which became exclusively equipped with the type), and OS2U-3s also served at Pensacola and Jacksonville naval air stations; their operational tasks included scouting for the fleet, gunnery spotting, anti-submarine patrol, ship-to-shore communciations and rescue of ditched airmen, of whom Captain Eddie Rickenbacker (forced down in the South Pacific) was the most famous. The interchangeable float/wheel landing gear enabled them to operate from shore bases when necessary. There were even occasions when OS2U floatplanes were flown into action as dive-bombers.

The OS2U-3 was selected by the British Purchasing Mission in 1941, and 100 aircraft (FN650-FN749) entered service with the Fleet Air Arm as the **Kingfisher Mk I**. Some of these joined No. 703 Squadron and, equipped with floats, served aboard British armed merchant cruisers for sea patrol during operations to combat German blockade runners. Most aircraft were delivered direct to the Middle East and West Africa, where they found limited use for coastal patrol and air-sea rescue. Fourteen aircraft were also used as trainers in Jamaica; 20 others intended for British use were in fact delivered to the US Navy.



A Kingfisher catapults from USS Texas *in the Mediterranean, 1944.* Texas *was the first US battleship to launch aircraft after being fitted with a flying-off platform while serving with the British Grand Fleet in 1918.*

Specification

Vought OS2U-3

Type: two-seat shipborne observation and scout floatplane

Powerplant: one 336-kW (450-hp) Pratt & Whitney R-985-AN-2 or -8 Wasp Junior radial piston engine

Performance: maximum speed 264 km/h (164 mph) at 1675 m (5,500 ft); climb to 1525 m (5,000 ft) in 12 minutes 6 seconds; service ceiling 3960 m (13,000 ft); range 1851 km (1,150 miles)

Weights: empty 1870 kg (4,123 lb); maximum take-off 2722 kg (6,000 lb)

Dimensions: span 10.95 m (35 ft 11 in); length 10.24 m (33 ft 7.25 in); height 4.60 m (15 ft 1 in); wing area 24.34 m^2 (262 sq ft)

Armament: one fixed forward-firing 7.62-mm (0.3-in) machine-gun and one 7.62-mm (0.3-in) machine-gun in the rear cockpit, plus 295 kg (650 lb) of bombs

Below: Over 1,300 Kingfishers were manufactured and became the exclusive equipment of the Inshore Patrol Squadrons, as well as serving with the fleet in various roles.

M41A2 and 141 M41A3 Bulldog light tanks delivered in the mid- to late 1960s from surplus US Army stocks has been reduced by attrition and cannibalization to some 200 vehicles, with most vehicles either now in reserve or in second-line units. Similarly, the 20 or so survivors of the 100 M24 Chaffee light tanks delivered in the 1950s and the M3 halftracks displaced from the infantry by the M113 APCs are no longer in the front line. The place of the M41s and the M24s has been taken in combat units by 148 British Scorpion tracked reconnaissance vehicles equipped with a 76-mm (3-in) gun. A full list of the army's equipment includes:

armour: M48A5 MBTs; M24, M41, M41A1, M41A3 and Scorpion light tanks; EE-9 Cascavel armoured cars; M3 halftracks; Saracen, V-150 Commando, M113A1 and M113A2 APCs and Shorland Mk 3 patrol cars;
artillery: (towed) 75-mm (2.95-in) M116 pack howitzers, 105-mm M101 howitzers, 155-mm (6.1-in) M114 howitzers and 155-mm M198 howitzers;
(mortars) 60-mm (2.36-in) M19, 81-mm (3.19-in) M1, 81-mm M29, 107-mm (4.2-in) M30 and 120-mm (4.72-in) unidentified model;
anti-tank weapons: 66-mm (2.6-in) M72 LAW rocket-launcher; 57-mm (2.24-in) M18, 75-mm M20, 90-mm M67 and 106-mm (4.17-in) M40A2 recoilless rifles and Dragon and TOW ATGWs;
air-defence weapons: (towed) 12.7-mm (0.5-in) M55, 20-mm M167, 40-mm M1 Bofors and 40-mm L/70 Bofors guns;
(self-propelled) 20-mm M163A1 and 40-mm M42A1 guns; (SAM) Redeye and Blowpipe shoulder-launched missiles; and
small arms: 9-mm Browning pistol; 9-mm Madsen SMG; 5.56-mm (0.219-in) HK33, 5.56-mm M16A1 and 7.62-mm (0.3-in) G3 assault rifles; 7.62-mm M60 LMG and 12.7-mm M2HB HMG.

To support the army in the field there are some 60,000 national police, 2,000 border police, 1,700 marine police and a 33,000-strong volunteer defence corps with small arms and some light armoured vehicles.

There is also an army aviation service with airmobile aviation companies and a number of independent helicopter flights. These fly some 117 fixed-wing light aircraft and 113 helicopters, of which the most important are 80 Cessna O-1E Bird Dogs and 76 Bell UH-1B/H Hueys. Army reserves total 500,000 men with four divisional HQs.

The Air Force

The 43,100-man Thai air force reflects its primary counter-insurgency role in having seven squadrons of COIN aircraft: one with 22 North American T-28D Texans, one with 15 Cessna A-37B Dragonflies, two with 25 Rockwell OV-10C Broncos, one with 25 Fairchild AU-23A Peacemaker gunships, one with 14 AC-47D Spooky gunships and one with 14 Lockheed T-33A armed trainers and three RT-33A reconnaissance jets.

The single squadron of fighter-bombers flying the survivors of 12 Northrop F-5As and 14 F-5Bs has been flown in recent months with the two Sidewinder-equipped squadrons of 40 F-5E and five F-5F Tiger II jets on air-to-ground strikes against Vietnamese positions located inside the Thai border. There is also a tactical reconnaissance squadron with four RF-5As, two RF-5E Tigereyes, five piston-engined photo-survey aircraft and 12 RC-47D Dakotas equipped with Elint systems. These continually monitor the Vietnamese incursions into Thailand and the various offensives within Kampuchea itself.

The transport fleet comprises three squadrons and a royal flight with some 10 C-47 Dakotas, 16 Fairchild C-123B Providers, five Lockheed C-130H/H-30 Hercules, 20 N22B Missionmasters, five Nurtanio-built CASA CN-212 Aviocars, 17 BAe 748s and three miscellaneous aircraft. These are backed up by two helicopter squadrons (with 18 Sikorsky S-58Ts, 27 UH-1Hs, four Sikorsky UH-60As and two Bell 412s) and three light observation/liaison squadrons (with 23 O-1E Bird Dogs and four Helio U-10s).

Royal Thai border police are seen in action in northern Thailand against drug suppliers. After a vicious firefight with the owners, a heroin factory valued at over two million US dollars was overrun.

To maintain sufficient aircrew to fly all its aircraft and helicopters, Thailand has expanded its training fleet to a strength of some 64 jet and 54 piston-engined trainers of six different types. Further to improve combat capabilities an order has been placed for 12 General Dynamics F-16 Fighting Falcons to match the latest Soviet types in the Vietnamese air force's inventory. More F-16s will be procured as soon as funds permit. For airfield defence against sapper attacks the four main Thai air bases have a battalion of air force troops equipped with Blowpipe SAMs, mortars and small arms.

The Navy

The 10,000-man Thai navy is undergoing some modernization to enable it to match the capabilities of its warlike neighbours, and the purchase of submarines to reform its underwater-warfare force is a real possibility. Of the new orders placed in recent years the most significant are those for two Harpoon-equipped Tacoma-built missile corvettes, and for the procurement of more missile boats and large patrol craft to join the existing force of light vessels.

There is a 500-man naval air arm which flies a squadron of 10 Grumman S-2F tracker ASW aircraft, with another performing the SAR/maritime patrol and transport missions with four Fokker F.27MPAs, four GAF N22 Searchmasters, two Canadair CL-215s and five Douglas C-47s. To support the marine corps there is a helicopter squadron of 14 Bell 212/UH-1H Hueys, and a light aviation squadron with 13 Cessna U-17s, 10 O-1E Bird Dogs, two Lake LA4s and seven Cessna O-2As used in the FAC, artillery observation, liaison and transport roles.

The marine corps is one of Thailand's elite fighting units and has a strength of some 20,000. The main strike force is a marine brigade of two infantry regiments, an artillery brigade and an amphibious assault battalion. The last is equipped with 22 LVTP7 and one LVTR7 amphibious assault tracked APCs, whilst the artillery regiment has four six-gun batteries of 23500-m (25,700-yard) range Israeli 155-mm M68 howitzers and two six-gun batteries equipped with the SRC GC45 155-mm gun-howitzer that can fire a base-bleed round to a maximum sea-level range of 38000 m (41,555 yards). The navy has also procured a number of MM.38 Exocet coastal SSM batteries.

The actual composition of the navy is:

frigates: one British 'Yarrow' type, two American 'PF103' type, one ex-American 'Cannon' class, and two ex-American 'Tacoma' class;
corvettes: two Tacoma design building (a third to be ordered);
light forces: three 'BMB230' class missile boats with MM.38 Exocet SSMs, three 'TNC45' class missile boats with Gabriel SSMs, three 'MV400' fast attack craft, four 'PSMM Mk 5' large patrol craft, six 'PC461' large patrol craft, three ex-USCG 'Cape' class large patrol craft, 10 ex-US 'PGM71' large patrol craft, seven 'T91' large patrol craft, 24 coastal patrol craft and 40 river patrol craft;
mine warfare forces: one support ship, four coastal minesweepers and five minesweeping boats;
amphibious warfare forces: five LSTs, three LSMs, two LSILs, one LCG, 10 LCUs, 26 LCMs, 12 LCVPs, 10 plus LCAs and three armoured troop carriers; and
support ships: three training, six oceanographic, one tanker, two harbour tanker, two water tanker, two transport and six miscellaneous vessels.

13 Pass